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STUDIES ON THE PERMEABILITY OF LIVING AND DEAD CELLS

V. THE EFFECTS OF $NaHCO_3$ AND NH_4Cl UPON THE PENETRATION INTO VALONIA OF TRIVALENT AND PENTAVALENT ARSENIC AT VARIOUS H ION CONCENTRATIONS

By MATILDA MOLDENHAUER BROOKS, Associate Biologist, Division of Pharmacology, Hygienic Laboratory, United States Public Health Service

These studies are a continuation of previously reported experiments on the effects of arsenic on the marine alga, *Valonia*. In a former paper (1), plants were exposed for one hour to $NaHCO_3$ solution before treatment with arsenic. This changed the pH of the sap from 6.4 to 5.2 or 5.4, producing an intracellular acidity by an accumulation of free CO_2 in the sap. It was found (2) that on aeration with CO_2 free $-NH_3$ free air, the sap became more alkaline than normal aerated sap, having changed from pH 6.8 to 8.4. This showed that in addition to free CO_2 basic ions also entered. Exposing the plants to $NaHCO_3$ before placing them in the arsenic solution affected the amount of arsenic entering the plant in the following manner: More arsenic was found in both the sap and the protoplasm when As_2O_5 was used; more arsenic in the sap but less in the protoplasm when As_2O_3 was used. Since the experiment was performed at an external pH of 5.0 only, and the plants were allowed to remain only one hour in the arsenic solution, it was thought of interest to make a more extensive investigation of this subject by studying the effects of exposure at various times up to 22 hours at different H ion concentrations.

In addition, it was thought of interest to produce an intracellular alkalinity and note its effects upon the amount of arsenic found in the cell. Intracellular alkalinity was induced by placing the plants in NH_4Cl solution, which was the method used by Jacobs (3) for *Rhododendron* petals. The writer (4) found that an exposure of one-half hour to NH_4Cl solution produced an intracellular pH of 9.0 in *Valonia* without injury to the cells (as shown by their subsequent viability).

The advantage of using a large single-celled organism like *Valonia* (which can be easily handled in permeability studies) is obvious. Errors such as those which are present in using mass cultures of microorganisms or whole or ground tissues are eliminated. In mass cultures it is not known into what portion of the organism the substance penetrates, as there is no way of separating a microscopic cell

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into its constituent parts and analyzing each one; the same is true of whole tissues—only the aggregate of the penetrating substance can be computed, and some of this may have occupied intercellular spaces; whereas the method of analyzing tissue juices has not only these drawbacks, but is also subject to an error of unknown magnitude due to the portion of the substance left behind during extraction. In working with mammalian organs *in vitro*, abnormal conditions must necessarily prevail; while *in vivo* many unknown and uncontrollable factors are present. It is evident that an ideal material would be a simple constructed living cell large enough to be separated easily into its constituent parts which would then be susceptible of separate analysis. This is precisely what we have in the case of the marine alga, *Valonia*. The species employed in this paper was *V. macrophysa* which is smaller than the species *V. ventricosa* used in the former work. (1), (2), (4). However the conclusions obtained by work on these species are broadly identical even if the data are not in all cases in exact quantitative agreement. The Florida species (*V. ventricosa*) is much more delicate than that used in Bermuda (*V. macrophysa*): the wall is thinner and the layer of protoplasm more delicate.[1] *V. macrophysa* grows in clumps rather than singly as does *V. ventricosa*. These clumps can be broken apart into the single plants and used as such.

V. macrophysa is less sensitive than *V. ventricosa* to changes in osmotic pressure, probably owing to the greater thickness of the layer of protoplasm and the wall; this is illustrated by the following experiment: To sea water in which the plants are, distilled water is added, thereby changing the osmotic pressure; *V. ventricosa* will burst in a few seconds, whereas *V. macrophysa* will remain intact for a considerable time before bursting.

An improved method was used in weighing the protoplasm of *V. macrophysa*. After the sap had been pressed out, the wall containing the protoplasm was weighed; then the protoplasm was washed out with distilled water and the wall carefully dried with filter paper and weighed. The difference between these two weights was the weight of the protoplasm. The probable error in the ratio between the mean weights of sap and protoplasm was 6.4 per cent of the mean. This is relatively high, owing to the difficulty in making an absolute separation of sap from the protoplasm. The probable

[1] The ratios by weight of sap to protoplasm and of sap to wall were found to be as follows:

	Sap : protoplasm	Sap : wall
V. ventricosa	164 : 1	257 : 1
V. macrophysa	25.3±1.6 : 1	103±1.6 : 1

error of the ratio between sap and wall is lower (1.6 per cent) because this difficulty is not met in separating the wall from the other constituents.

It is readily seen how much heavier the protoplasm and wall are in *V. macrophysa* than in *V. ventricosa*.

METHOD

The plants were separated into three groups when ready for use. The first group was placed in sea water only, the second group for one hour in sea water containing $NaHCO_3$ (0.03 M), and the third group for one-half hour in sea water containing NH_4Cl (0.04 M). The cells in the last two solutions were carefully rinsed with fresh sea water and dried on filter paper, and three sets were then simultaneously placed in the arsenic solution. The H ion concentrations of the sap of the three sets at the beginning of the experiments were as follows: the first set was normal (pH = 6.4), the second set abnormally acid (5.4 to 5.2), and the third set alkaline (9.0). As is explained later, the pH of the sap returned to normal in most cases during the course of the experiment when plants were in arsenic solution. The initial pH values were not retained.

All pH determinations were done with indicators. The indicated pH of the sea water used was 8.2 at 22° C., cresol red, thymol blue, and borax buffers being used as standards. No correction was made in these tables for salt error because there are no data for the salt errors of the indicators in *Valonia* sap, and it was thought desirable to keep all figures comparable. Other workers (7) have obtained pH 8.2–8.0 at this temperature for water of Bermuda taken from the same locality as that used in these experiments. The figure obtained by the writer agrees with this when the proper correction for salt error is made.

The pH of the sap of *Valonia* as obtained by Crozier (7) was 5.0 to 6.7, the mode being at 6.0 and the average 5.9. These figures were corrected for the salt error in sea water of the indicator used. *Valonia* sap, tested with brom thymol blue and methyl red, by comparison with NaOH and phosphate–NaOH buffers prepared in the Division of Chemistry of the Hygienic Laboratory ordinarily gave an indicator color corresponding to pH 6.4. Whenever the sap of a given cell had a higher pH than this the cell was discarded. Some cells, however, had a slightly lower pH.

The salt error for *Valonia* sap is not known. Corrections, however, could be made by considering the molecular concentration of *Valonia* sap about 0.5 (it is approximately that of sea water). Since, however, there are no data for some of the indicators used, it was thought better to make no corrections. This does not invalidate the conclusions, which are comparative.

The further procedure was as follows: At stated intervals the plants were taken out of the arsenic solution, carefully rinsed to free them of contaminating arsenic, quickly dried on filter paper and pierced with a fine pointed piece of clean glass. The sap, being under pressure, comes out readily and leaves the protoplasm lining the wall. The wall is cut open farther and the protoplasm washed out with sea water or distilled water from a small dropper. The wall thus remains as a clear transparent membrane. These three constituents—the sap, protoplasm and wall—placed in separate crucibles, are dried, incinerated, and analyzed for arsenic according to the Gutzeit method.

The Gutzeit test is described in a previous publication(1). This method is sensitive to 1 mmg. In these experiments from 3 to 5 plants containing from one to two c. c. of sap each were used for each determination. This produced a greater stain on the test paper, enabling one to read the test more accurately. Since all the numbers were reduced to a common unit—mmg. of arsenic per 1 c. c. of sap—the readings recorded here are sometimes less than 1 mmg. and appear as though they were taken below the limit of sensitivity of the test.

In comparing the amounts of arsenic found in the three components of the cell, the actual amounts found in the protoplasm and wall were multiplied by the figures indicating the ratios between the weight of the sap and those of these two components (25.3 for protoplasm and 103 for wall). This gives figures representing the relative concentration of As in each part of the cell.

Both pentavalent and trivalent forms of arsenic were used. In the case of the former, orthoarsenic acid ($As(OH)_3 + \frac{1}{2} H_2O$) was the reagent actually used, but for convenience and clearness this will be designated throughout this paper as As_2O_5, in contrast to As_2O_3, which was used as such.

Arsenic in the form of As_2O_5 or As_2O_3 was dissolved in distilled water and brought to the desired pH by the addition of NaOH. Sea water could not be used as a solvent on account of the precipitation of Mg by NaOH. After NaOH combines with arsenic the resulting sodium salt can be added to sea water without precipitating Mg. The concentration of the solutions used was 0. 002 M in respect to arsenic. The volume of the solution in which the plants were placed was 200 c. c. The temperature varied only slightly from 22° C.

All the reagents used were special arsenic-free preparations which were tested and found to contain no arsenic. No arsenic was found in *Valonia* in the control experiments.

The external pH was varied from 5 to 9 and kept constant at any given pH below 8.4 by adding traces of HCl. At pH 8.4 and above, the sodium arsenate and Na arsenite act as buffers, and the pH

remains constant; but at lower pH values there is a tendency to shift to more alkaline reactions. Buffers were not used because of their complicating effects described in a previous paper (1). The internal pH of the cells was also varied, as explained above, by the use of $NaHCO_3$ and NH_4Cl, giving internal acidity and alkalinity respectively. Various combinations of sodium and potassium bicarbonates and arsenates were tried at various external pH values, but no significant differences were found. Since the changes of internal pH are, at most, of a few hours duration, the data must be considered with this point in mind.

All experiments were paralleled by survival tests, the results of which are given in Table 1. The importance of determining whether the plants were injured by treatment with arsenic was discussed in a previous paper (1).

The plants were kept as long as possible in bowls containing sea water, which was renewed every day. Some were kept longer than 30 days; but cells surviving in good condition, i. e., remaining turgid and olive green in color, for this length of time were considered to have been uninjured and were ordinarily discarded. The normal plants survived under laboratory conditions a month or more. Where a shorter time of survival is indicated, injury had probably occurred. Each figure is representative of from six to forty plants.

Normal untreated cells of *V. macrophysa* could be depended upon to live one month or more under laboratory conditions, i. e., in 500 c. c. finger bowls (flat glass dishes) containing sea water, which was renewed daily, while *V. ventricosa* (the species considered in previous papers (1), (2), (4), under the same conditions survived for from ten days to one month.

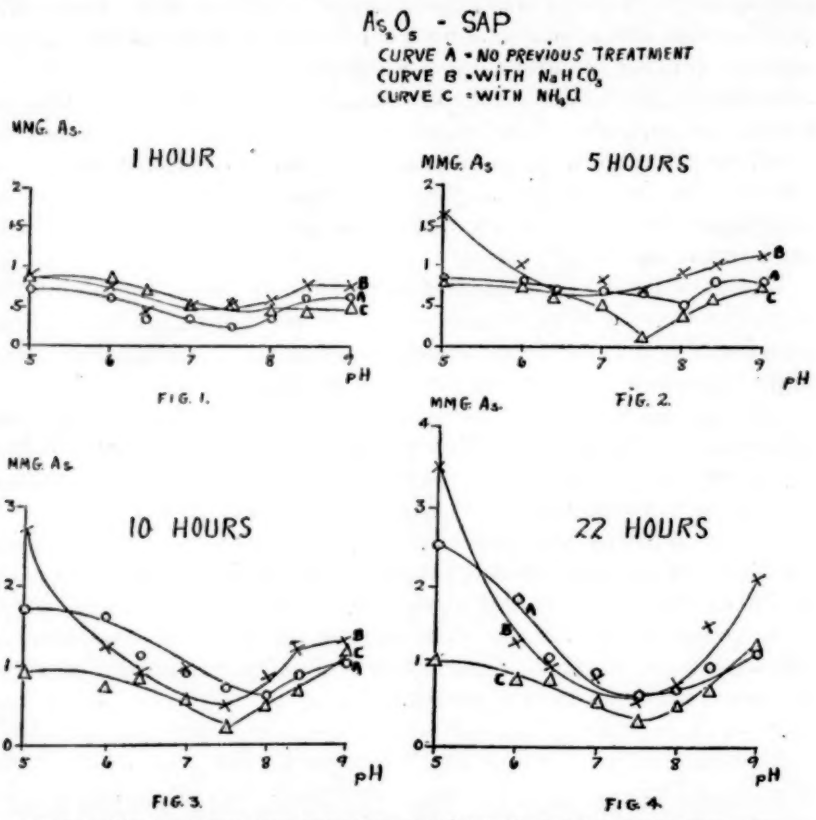
RESULTS

Pentavalent arsenic is less toxic to *Valonia* than trivalent arsenic in the same concentration and at the same H ion concentrations; in fact 22 hours' exposure to trivalent arsenic produced definite evidence of injury, as shown in Table 1, plants treated in this way surviving less than 30 days and in a few cases only a few days after they had been replaced in sea water. Therefore the increased amount of arsenic in cells treated for 22 hours with As_2O_3 may be considered as due at least in part to injury of the cell.

PENETRATION INTO THE SAP

Figures 1 to 16 represent the number of micromilligrams of As found (ordinates) in the sap when the external solution was kept at various pH values (abscissae). There are 4 figures to each set, representing determinations after 1, 5, 10, and 22 hours in the ar-

senic solution. There are three curves for each figure, representing the three H ion concentrations of the internal sap—normal (A); more acid (by treatment with $NaHCO_3$), (B); and alkaline (by treatment with NH_4Cl) (C). Each point on the curve represents the mean of from three to nine experiments on from two to five



FIGS. 1–4.—Number of mmg. of arsenic in the sap of *Valonia* (ordinates) at various H ion concentrations of the external solution (abscissae) after plants had been 1, 5, 10, and 22 hours, respectively, in a solution of pentavalent arsenic (As_2O_5) of 0.002 M in sea water. Curve A, without treatment previous to placing the cells in arsenic; curve B, in $NaHCO_3$ solution (0.03 M) for one hour previous to arsenic treatment; curve C, in NH_4Cl (0.04 M) for one-half hour previous to arsenic treatment.

plants each. The probable error of the mean is less than 6 per cent of the mean. In all the experiments the minimum amount of arsenic was found at an external pH of approximately 7.0 to 7.5. This agrees roughly with the writer's previous work in which the minimum amount of arsenic was found at approximately pH 7.0.

There was one marked difference in the results with trivalent and pentavalent arsenic. In the former case the amount of arsenic penetrating was slightly increased by previous treatment with $NaHCO_3$, and considerably increased by previous treatment with

NH_4Cl. When pentavalent As was used, considerably more arsenic was found in the sap when $NaHCO_3$ was previously used, but considerably less when NH_4Cl was used. These effects represent the mean effect at all pH values, and at all four readings during each experiment, but slight quantitative deviations occur when individual pH values of the external solution or different periods of exposure to these solutions are considered separately—for example at the extreme acid and alkaline ends of the pH range.

$NaHCO_3$ produces a decided increase in the amount of arsenic found when As_2O_5 is used, whereas in the case of As_2O_3 it causes an increase only in the more acid solutions. Table 9 gives the ratios between the amounts of arsenic found when $NaHCO_3$ or NH_4Cl are used and the normal amounts at corresponding pH values of the outside solution.

Table 10 gives a comparison of the ratios of concentrations of arsenic found in cells treated with either $NaHCO_3$ or NH_4Cl as compared with control cells after exposure to arsenic solution. These figures are the averages of all determinations.

The figures show the following average change in the amounts of As found in the sap: As_2O_3 with $NaHCO_3$, +9 per cent; with NH_4Cl, +66 per cent; As_2O_5 with $NaHCO_3$, +32 per cent; with NH_4Cl, −8 per cent.

It is interesting to note the reversal of the effect of NH_4Cl when As_2O_3 is substituted for As_2O_5. This is most marked when the external solutions are acid, and then mainly after the first five hours.

It is important from the point of view of explaining the observed phenomena to note the change in rate of As penetration during the course of the different experiments. If the rate of penetration changes during the progress of an experiment it can hardly depend on the external pH, which remains constant; and, *vice versa*, if the rate of penetration is constant it could hardly depend on the internal pH, which varies as the experiment goes on.

The progressive changes of internal pH are shown in Table 2, in which the pH of the sap is shown at the time of taking each reading under various conditions of previous treatment and external pH in the experiments represented in the figures.

Previous treatment for one hour with $NaHCO_3$ causes free CO_2 to accumulate in the cell sap so that its pH becomes 5.2 to 5.4, whereas previous treatment for one-half hour with NH_4Cl produces, by the accumulation of NH_3, a pH of 9.0 in the cell sap. When the cells are subsequently placed in alkaline solutions the pH of the sap has in most cases returned to normal within 10 hours. In acid solutions, (pH 5.0) the sap becomes more acid than normal; its pH becomes the same as that of the external solution when this has a pH of 6.0

As_2O_3 - SAP

CURVE A - WITHOUT PREVIOUS TREATMENT
CURVE B - WITH $NaHCO_3$
CURVE C - WITH NH_4Cl

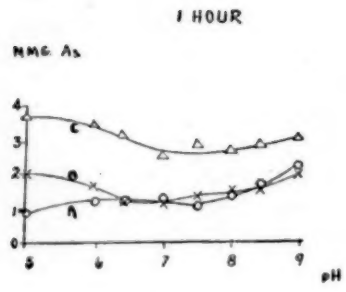


FIG. 5

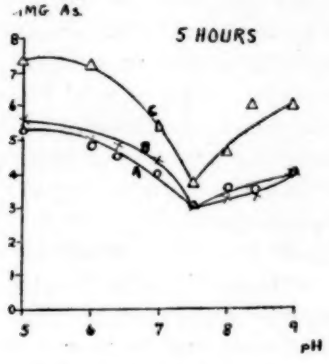


FIG. 6

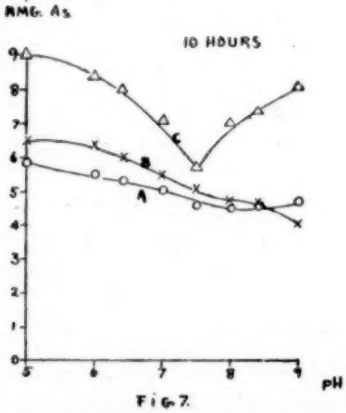


FIG. 7

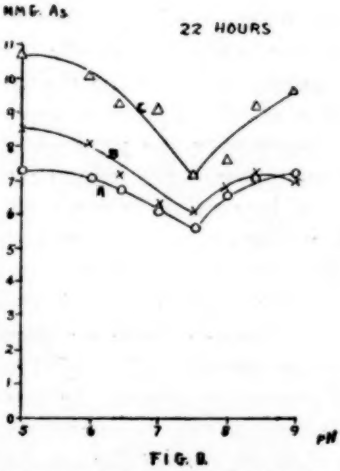


FIG. 8

FIGS. 5-8.—Number of mmg. of arsenic in the sap of *Valonia* (ordinates) at various H ion concentrations of the external solution (abscissae) after plants had been 1, 5, 10, and 22 hours, respectively, in a solution of trivalent arsenic (As_2O_3) of 0.002 M in sea water. Curve A, without treatment previous to placing the cells in arsenic; curve B, in $NaHCO_3$ solution (0.03 M) for 1 hour previous to arsenic treatment; curve C, in NH_4Cl (0.04) for one-half hour previous to arsenic treatment.

or 6.4. These changes are practically independent of the previous treatment, whether with $NaHCO_3$ or NH_4Cl.

The rate of penetration of arsenic also varied during the progress of most of the experiments. Thus, when NH_4Cl is used, arsenic of the pentavalent type penetrates more slowly at all pH values of the external solutions; during the first hour the difference is insignificant. In acid solutions the difference is very marked; but when alkaline solutions are used the difference gradually diminishes or even vanishes during the progress of the experiment. When trivalent arsenic is used, the rate of penetration is affected in the opposite manner—an increase in the amount of arsenic is evidenced from the first hour. Except in the more alkaline external solutions the difference in As content between the saps of treated and normal cells seems to remain about the same throughout the 22 hours. In other words, it would appear as if the effects of free NH_3 in the sap, which caused the increased penetration of arsenic during the first hour, no longer persisted after the first hour; after that time the rate of penetration was the same as the rate into the control cells, the arsenic content at the same time keeping the initial amount in advance of the normal. In the alkaline external solutions, however, there is some evidence that the increased rate of penetration is maintained throughout a considerable part of the experiment.

$NaHCO_3$, used with As_2O_5, increases the amount of arsenic found in the sap. When acid solutions are used, this increase is apparent at the first reading (1 hour); but alkaline solutions delay the increase, which is apparent only in the last reading (after 22 hours). Between pH's 6.0 and 8.0 $NaHCO_3$ has very little effect. In the case of As_2O_3 there is an increase in the amount of arsenic at pH 5.0 (external solution) which is perceptible at the end of the first hour; after that time there is no further gain; the rate of penetration becomes essentially the same as that into untreated cells. Except at pH 5 the differences in As content, while consistently in favor of cells previously treated with $NaHCO_3$, are almost negligible.

Briefly stated, more arsenic penetrates through the protoplasm into the sap when trivalent arsenic is in the external solution than when pentavalent arsenic is used. This is true in all three conditions which governed the experiments—A, normal; B, with $NaHCO_3$; and C, with NH_4Cl. It is most marked in the alkaline range, and still more so when NH_4Cl is used.

ACCUMULATION IN THE PROTOPLASM

In the protoplasm more arsenic is found when the pentavalent form is used; $NaHCO_3$ increases and NH_4Cl decreases this amount. It would seem, therefore, that pentavalent arsenic unites with or is otherwise led to accumulate in the protoplasm to a greater extent

1

As_2O_5 - PROTOPLASM

CURVE A = NO PREVIOUS TREATMENT

CURVE B = WITH $NaHCO_3$

CURVE C = WITH NH_4Cl

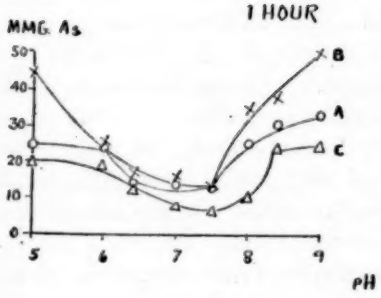


FIG. 9

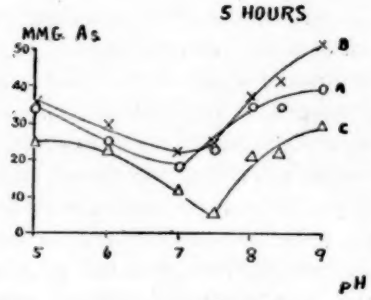


FIG. 10

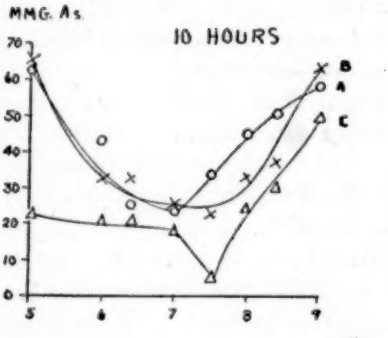


FIG 11

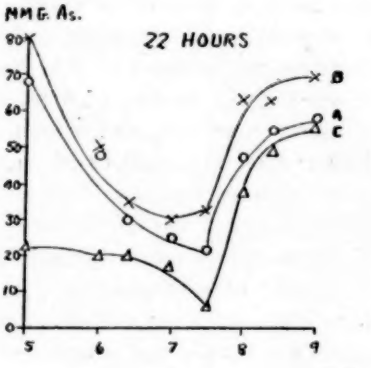


FIG. 12

FIGS. 9-12.—Number of mmg. of arsenic in the protoplasm of *Valonia* (ordinates) at various H ion concentrations of the external solution (abscissae) after plants had been 1, 5, 10, and 22 hours, respectively, in a solution of pentavalent arsenic (As_2O_5) of 0.002 M in sea water. Curve A, without treatment previous to placing the cells in arsenic; curve B, in $NaHCO_3$ solution (0.03M) for 1 hour previous to arsenic treatment; curve C, in NH_4Cl (0.04 M) for one-half hour previous to arsenic treatment.

than trivalent arsenic, except when NH_4Cl is used. Trivalent arsenic appears to filter through rapidly into the sap.

The results are summarized in Table 9, in which are given the ratios of the mean arsenic contents of the protoplasm of cells exposed to solutions of trivalent as compared with pentavalent arsenic. These ratios are given for each of the three types of previous treatment (normal, $NaHCO_3$ and NH_4Cl) under two conditions: External solution acid (pH 5.0–6.0) and external solution alkaline (pH 8.0–9.0). The probable error of the mean is less than 3 per cent of the mean.

It will be seen that the ratios are further from unity when the arsenic is penetrating from acid solutions, whereas the greater differences in As content of the sap were observed when the external solutions were alkaline.

Just what the relation between the pH of the sap and that of the protoplasm is, is not known; but it seems probable that when there is an excess of CO_2 or NH_3 over the normal in the sap, there would also be an excess of free CO_2 or NH_3 in the protoplasm, especially since these substances had to come through the protoplasm to get into the sap.

Table 10 gives the ratios of concentrations of arsenic in the protoplasm of previously treated cells as compared with control cells after exposure to arsenic solutions of different pH values.

The figures for protoplasm show the following average change in the amount of As found in the protoplasm: As_2O_3 with $NaHCO_3$, -2 per cent; with NH_4Cl, $+51$ per cent; As_2O_5 with $NaHCO_3$, $+16$ per cent; with NH_4Cl, -35 per cent.

The same reversal of the effect of NH_4Cl on the amount of arsenic in the sap is found in the protoplasm to a more marked degree when trivalent and pentavalent arsenic are substituted for each other. Differences in the effect of $NaHCO_3$ are also apparent.

ARSENIC CONTENT OF THE CELL WALL

Tables 7 and 8 give the data for penetration of both kinds of arsenic into the wall. They suggest the lack of influence of the wall upon the penetration of substances into the interior. No consistent differences are shown and, therefore, no curves are plotted. The numbers given in the tables were obtained by multiplying the experimental figures by 103, the ratio between the weight of the sap and that of the wall, and, hence, indicate the concentrations of As in the same units as those given above for the sap and protoplasm.

GENERAL COMPARISONS

Tables 3 to 6 give the data from which Figures 1 to 20 are computed. Figures 17 to 20 show more clearly how changes in the H ion concentration of the interior of the cell affect the amount of

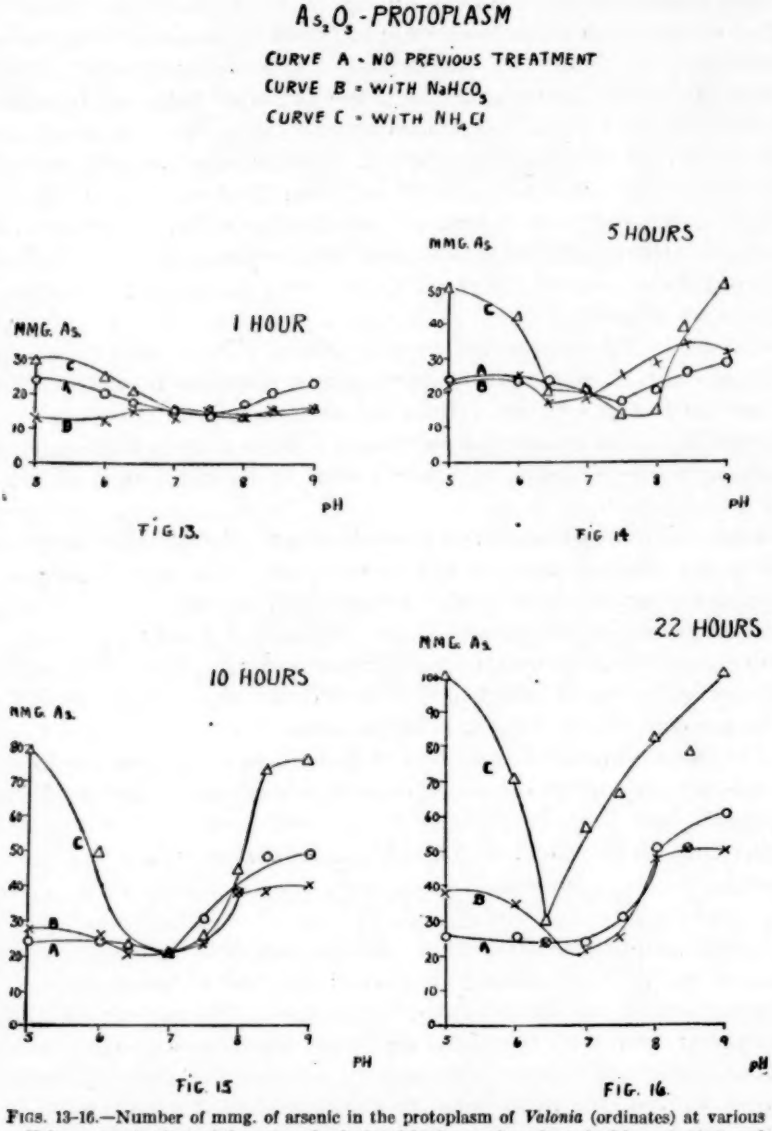


FIG 13. FIG 14

FIG 15 FIG. 16.

FIGS. 13–16.—Number of mmg. of arsenic in the protoplasm of *Valonia* (ordinates) at various H ion concentrations of the external solution (abscissae) after plants had been 1, 5, 10, and 22 hours, respectively, in a solution of trivalent arsenic (As_2O_3) of 0.002 M in sea water. Curve A, without treatment previous to placing the cells in arsenic; curve B, in $NaHCO_3$ solution (0.03 M) for 1 hour previous to arsenic treatment; curve C, in NH_4Cl (0.04 M) for one-half hour previous to arsenic treatment.

arsenic found in the sap and protoplasm at different external H ion concentrations from pH 5.0 to 9.0. In these diagrams the pH of the sap is given at the time when *Valonia* is placed in the arsenic solution. It must be understood that this gradually changes in the course of an hour (see Table 2). The H ion concentration of the sap was measured by the indicator method, as was stated before, but that of the protoplasm could not be so measured. The pH of the protoplasm is undoubtedly affected by free CO_2 and free NH_3, because these substances have to pass through the protoplasm in order to reach the sap; but, since the constituents of the protoplasm may resist changes of reaction the H ion concentration of the protoplasm would perhaps not always be exactly the same as that of the sap. The difference could hardly be of any great magnitude; the internal pH values for protoplasm are given with this reservation. These values were determined only at the end of the first hour before the internal pH had undergone any great change from its initial value.

There is a decided tendency for more arsenic to penetrate into the sap from a solution of As_2O_3 when the sap is alkaline, and less when it is more acid than normal (Fig. 17). The same general relations between internal pH and arsenic content are valid for protoplasm as long as the external solution has a pH of 7.0 or less. At 7.5 there is no effect of internal pH, and in more alkaline solutions the arsenic content decreases with increasing internal pH (Fig. 18).

When pentavalent arsenic is used the amount of arsenic found in the sap is greater when the internal pH is either above or below normal, except when the external solution is alkaline (pH 8.4 and 9.0). This is shown in Figure 19. In these last two curves there is less arsenic found when the internal pH and the external pH are both alkaline.

The amount of arsenic found in the protoplasm of cells exposed to solutions of As_2O_5 decreases decidedly when the sap is alkaline, and increases decidedly when the sap is more acid than normal.

In general, then, pentavalent arsenic penetrates better when the sap is acid, and trivalent arsenic penetrates better when the sap is alkaline; but when the external solution is alkaline, the effects of internal alkalinity are greatly affected. This is noticeable in the case of As_2O_3–sap (Fig. 17) in which case the difference in As content of the sap at the internal pH values 7.0 and 9.0, for example, is greatly decreased; it is particularly striking in the cases of As_2O_3–protoplasm and As_2O_5–sap where an increase is turned into a decrease (Figs. 18, 19), and is seen as a reenforcement of the effects of internal pH in the case of As_2O_5–protoplasm (Fig. 20), where alkalinity of the sap already acts to hinder the accumulation of arsenic.

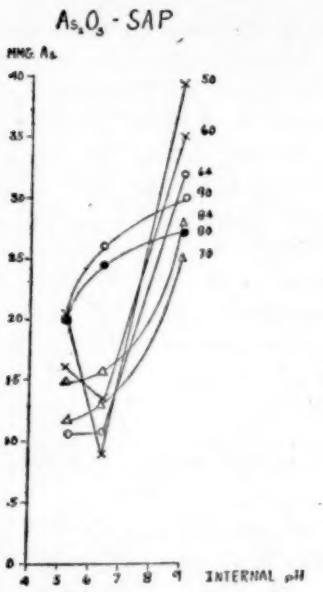


FIG. 17.

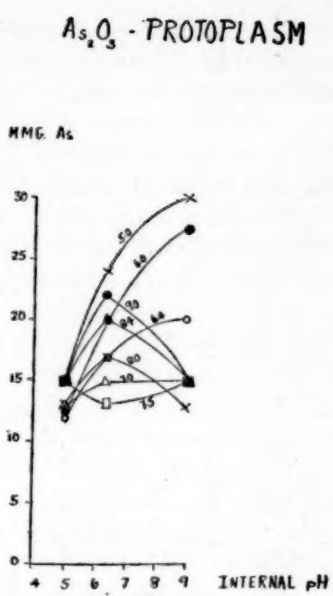


FIG. 18.

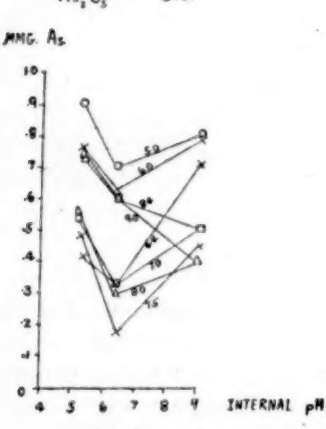


FIG 19

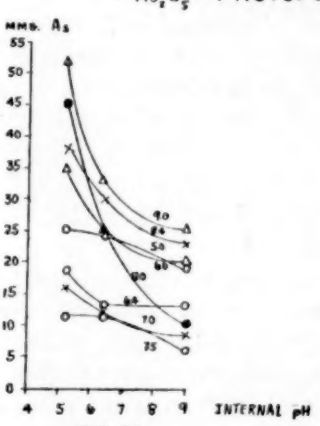


FIG. 20.

FIG. 17.—Number of mmg. of arsenic (ordinates) in the sap of *Valonia* when the internal pH is varied (abscissae), at the same time keeping the pH of the external solution constant (numbers on the curves). Plants remained 1 hour in the trivalent arsenic solution of 0.002 M in sea water before being tested for arsenic.

FIG. 18.—Number of mmg. of arsenic (ordinates) in the protoplasm of *Valonia* when the internal pH is varied (abscissae), at the same time maintaining a constant external pH (numbers on the curves). Plants remained 1 hour in the trivalent arsenic solution of 0.002 M in sea water before being tested.

FIG. 19.—Number of mmg. of arsenic (ordinates) in the sap of *Valonia* when the internal pH is varied (abscissae), at the same time maintaining a constant external pH (numbers on the curves). Plants remained 1 hour in the pentavalent arsenic solution of 0.002 M in sea water before being tested.

FIG. 20.—Number of mmg. of arsenic (ordinates) in the protoplasm of *Valonia* when the internal pH is varied (abscissae), at the same time maintaining a constant external pH (numbers on the curves). Plants remained for 1 hour in the pentavalent arsenic solution of 0.002 M in sea water before being tested for arsenic.

DISCUSSION

Since the changes in internal pH are only temporary, it is of interest to analyze the data with a view to determining whether the increased arsenic contents recorded for the later readings are the result of a continuous gain compared with the normal, or whether they are only the result of a "head start" obtained before the effects of the $NaHCO_3$ or NH_4Cl had disappeared. In most cases it certainly seems as if the initial increase or decrease were not permanent, i. e., that the effects due to $NaHCO_3$ or NH_4Cl were only temporary; but the rate of penetration of arsenic from an As_2O_3 solution into the protoplasm of cells previously treated with NH_4Cl seems to remain for some time in excess of the normal rate. Since data are not consistent in this respect, no generalization can be made as to whether the observed effects are immediate results of the presence of NH_3 and CO_2 or whether they are of a secondary nature.

The data are also to be examined from the point of view of possible correlation between arsenic penetration and pH. Three determinants at least are to be considered: first the effect of the pH of the external solution on the concentration of undissociated acid, and of arsenate and arsenite anions in the solution bathing the cell; second the effects of the internal pH on the amount of free, undiffusible, weak base available in the protoplasm to combine with and hold the arsenic anion; third, possible effects of the pH on the viscosity or some other property of protoplasmic constituents of an ampholytic type. This should produce an inflection in the curve representing arsenic content as a function of pH, the inflection corresponding to an isoelectric point or region.

(*a*) EXTERNAL pH

Crane (5) has studied the toxicity of various alkaloids to *Paramecium* and found that those having comparatively large dissociation constants varied in toxicity with changes in H ion concentration in such a way as to indicate that the effect of hydrogen ions upon toxicity is due to an action upon the drug rather than upon the cell itself. Crane attributes the effects of the drugs to the undissociated free base, which in the case of alkaloids with high dissociation constants, becomes greater in amount as the H ion concentration is decreased. It has been suggested that the differences in penetration of the two acids of arsenic at various H ion concentrations is likewise due to differences in dissociation of these acids at different H ion concentrations of the solution bathing the cells.

The influence of the H ion concentration upon the dissociation of arsenic and arsenious acids may be deduced from the following equations:

If we have an acid, HA, with a dissociation constant K_a, then

$$\frac{(A^-) \times (H^+)}{(H\,A)} = K_a$$

where A^- and H^+ are the anion and hydrogen ion, respectively, and brackets denote concentration of the substance indicated, or

$$\frac{(H^+)}{K_a} = \frac{(HA)}{(A^-)}$$

Since the salts of the acids with strong bases may be regarded as being completely dissociated, we may consider that all the arsenic in the solution is in the form of either HA or A^-, the undissociated salt BA being negligible in amount, and

$$(A^-) + (HA) = 1$$

The first dissociation constants of these two acids are 5×10^{-3} for arsenic (8) and 6×10^{-9} for arsenious (9.) The second and third dissociation constants are so small that they may be neglected. Substituting into the above equations these values and assuming different values of (H) we may calculate the proportions of dissociated and undissociated acid at the extreme H ion concentrations used, pH 5.0 and pH 9.0:

	pH 5.0	pH 9.0
Arsenate anion	0.998	0.999+
Undissociated arsenic acid	.002	.0000002
Arsenite anion	.37	.999+
Undissociated arsenious acid	.63	.00017

Practically all of the arsenic of arsenic acid is in the form of the dissociated anion at both H ion concentrations indicated, and therefore at all intermediate H ion concentrations. It follows that if the penetration of arsenic acid into *Valonia* depended upon the dissociation of the acid alone, the curves showing arsenic penetration as a function of pH should form a straight line. The figures show that this is not the case—the curves all have minimum penetration at pH values near neutrality. The curves suggest rather the result of an isoelectric point or region. Therefore the dissociation of the acid can not be the principal factor responsible for the rate of penetration of arsenic acid.

In the case of arsenious acid less of the acid is dissociated at pH 5.0 (37 per cent) than at pH 9.0 (99 per cent). If the penetra-

tion of arsenious acid depended upon the amount of arsenite ion present, then one ought to find three times as much arsenic penetrating at pH 9.0 as at pH 5.0. The sap never shows any such effect, and the protoplasm shows it only after the first five hours. It is obvious that the evidence is against the hypothesis that only undissociated acid penetrates. The presence in the curves of a minimum near the neutral point suggests again the influence of an isoelectric point or region. We may conclude, therefore, that the pH of the external solution does not produce its characteristic effects by influencing the dissociation of these two acids, but rather through some intermediary effect upon the protoplasm. If there is any effect at all in the case of As_2O_3, it is effectively concealed by other more important factors.

(*b*) INTERNAL pH

The second possible determining factor to be considered is the effect of internal pH on cell constituents.

McCutcheon and Lucke (6) investigated the effects upon the penetration of dyes of changes of both internal and external hydrogen ion concentrations. When the interior of the cells was alkaline, alkaline dyes penetrated less rapidly than when the cells retained their normal acidity, even if the external solutions were of the same alkalinity in both cases. When the internal H ion concentration was increased, however, by free CO_2, even more dye was present than in normal sap. They conclude from this that a basic dye combines with some acid substance of the protoplasm which is an ordinary acid rather than an ampholyte.

In the experiments of the writer the anion rather than a cation is to be considered. If the above theory is applied, more arsenic should be found when the interior of the cell is alkaline rather than acid. This is the case when arsenious acid is used and when the external pH of the surrounding solution is 6.0 to 9.0, but not when it is 5.0.

Arsenic acid does not conform at all to this hypothesis, because less arsenic is found in both protoplasm and sap when they are made more alkaline.

The explanation invoked by McCutcheon and Lucke to explain their results is inadequate in the case of arsenic. This leaves us with only the third possibility, namely, that the internal pH affects some physical property of a cell constituent or constituents of an ampholytic nature, thus leading to the presence of a minimum in the experimental curves, which minimum corresponds to an isoelectric point or region.

However, since the isoelectric points of most of the recognized ampholytes of the type present in plants lie at a lower pH than the

minima found in these experiments on arsenic (pH 4.5—5.5 rather than 7.0), the position of this minimum may be affected by something besides the ampholytes. This may possibly be a result of the presence of a weak base acting in a way analogous to the action of the weak acid in McCutcheon and Lucke's theory.

SUMMARY

The differences in the penetration of trivalent and pentavalent arsenic into *Valonia* under various conditions led to the following conclusions:

1. When *Valonia* is placed in solutions of arsenic at various H ion concentrations, the concentration of arsenic found in the sap is less than that in the protoplasm. With trivalent arsenic the difference is less than with pentavalent arsenic.

2. The minimum amount of arsenic penetrates into the sap and the protoplasm when the external arsenic solution is approximately neutral.

3. When free CO_2 is allowed to accumulate in the plant, and the plants are then placed in pentavalent arsenic solutions of various H ion concentrations, more arsenic is found in both the sap and the protoplasm than in normal plants placed in similar arsenic solutions. When trivalent arsenic is used instead, the concentration of arsenic in the sap is increased, whereas that in the protoplasm is decreased.

4. When free NH_3 is allowed to accumulate in the plants and the plants are then placed in pentavalent arsenic solutions of various H ion concentrations, less arsenic is found in the sap and the protoplasm than in normal plants placed in similar arsenic solutions. When trivalent arsenic is used instead, more arsenic is found in the sap and in the protoplasm than in normal plants placed in similar arsenic solutions.

5. The pH of the external solution, as well as that of the inside of the plant, affects the rate of penetration of pentavalent and trivalent arsenic. When either or both the external or internal pH values are low, more pentavalent and less trivalent arsenic is found in the protoplasm and in the sap; the opposite is true when the external solution and the interior of the cell are alkaline.

6. There is no difference in the amount of As found in the wall under varying conditions; apparently the wall does not affect the rate of penetration of As into the protoplasm and the sap.

7. It has been shown that—

(*a*) Differences in the rate of penetration of arsenic as influenced by changes in external pH, can not be explained by attributing them to dissociation of the acids and subsequent effect on the arsenic in the external solution.

(*b*) These differences in the rate of penetration seem to be due to effects on the protoplasm initiated by changes in both the internal pH of the cell and the pH of the bathing solution.

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TABLE 1.—*Number of days of survival of Valonia after exposure to arsenic in sea water*

Previous treatment with	Seawater		Seawater + $NaHCO_3$ (0.03 M)		Seawater + NH_4Cl (0.04 M)		Normal
Hours in solution	10	22	10	22	10	22	
PENTAVALENT							
pH of As solution:							
5.0		35		45	40	30	
6.0						30	
6.4		39		40		30	
7.0		37		38	30	6	
7.5		30		39		30	
8.0		70		60		40	
8.4		40		40		40	30 days.
9.0		39		40	30	20	
TRIVALENT							
5.0	10	1	10	4	3	2	
6.0		30		30		30	
6.4	35	10	30	3	35	6	
7.0	50	15	30	4	30	9	
7.5	30	10	33	2	3	2	
8.0	34	2	32	10	28	3	
8.4	30	2	30	4	30	4	
9.0	30	4	30	5		30	

TABLE 2.—*pH of the sap of Valonia after exposure to arsenic in sea water*

With As_2O_3

Previous treatment	Seawater					Seawater+$NaHCO_3$ (0.03 M)					Seawater+NH_4Cl (0.04 M)				
Hours in solution	0	1	5	10	22	0	1	5	10	22	0	1	5	10	22
pH of arsenic solution:															
5.0	6.4	5.2	5.4	5.2	5.4	5.2	5.5	5.3	5.2	----	9.0	5.8	5.8	5.2	5.0
6.0	6.4	6.0	5.4	5.4	5.4	5.2	----	----	----	----	9.0	6.8	6.2	6.0	6.0
6.4	6.4	6.4	6.4	6.4	6.4	5.2	6.4	6.4	6.4	6.4	9.0	6.4	6.4	6.4	6.4
7.0	6.4	----	----	----	6.4	5.2	----	----	----	----	9.0	6.8	5.8	6.0	6.2
7.5	6.4	6.4	6.4	6.4	6.4	----	----	----	----	----	9.0	----	----	7.8	7.6
8.0	6.4	6.2	6.4	6.4	6.4	5.2	----	----	----	----	9.0	6.8	6.2	6.4	6.4
8.4	6.4	6.4	6.4	6.2	6.4	5.2	----	----	----	----	9.0	6.8	6.4	6.4	6.4
9.0	6.4	6.4	6.4	6.4	6.4	5.2	6.4	6.2	6.4	6.4	9.0	7.0	6.8	6.4	6.4

With As_2O_3

5.0	6.4	6.0	5.5	5.2	5.2	5.2	5.2	5.2	5.2	5.0	9.0	6.6	5.4	5.0	5.0
6.0	6.4	6.2	6.0	6.0	6.0	5.2	5.8	6.0	6.0	6.0	9.0	6.8	6.0	6.0	6.0
6.4	6.4	6.4	6.4	6.4	6.4	5.2	6.0	5.8	6.0	6.4	9.0	6.8	6.2	5.8	6.4
7.0	6.4	6.4	6.2	6.2	6.4	5.2	6.2	5.6	6.0	6.4	9.0	6.8	6.8	6.0	6.6
7.5	6.4	6.4	6.4	6.4	6.4	5.2	6.0	6.4	6.4	6.4	9.0	6.8	6.0	6.4	6.6
8.0	6.4	6.4	6.2	6.4	6.4	5.2	6.0	6.0	6.4	6.4	9.0	6.8	6.6	6.4	6.4
8.4	6.4	6.4	6.4	6.4	6.4	5.2	5.8	6.0	6.6	6.6	9.0	7.0	6.0	6.4	6.4
9.0	6.4	6.4	6.4	6.4	6.4	5.2	6.4	5.7	6.4	6.4	9.0	7.0	6.0	6.0	6.6

TABLE 3.—*Arsenic content of sap of cells treated with As_2O_3 solution*

A = Normal.
B = Previous exposure to seawater+$NaHCO_3$
C = Previous exposure to seawater+NH_4Cl.

Hours in solution		1		5		10		22	
		Mmg. As/gm. sap	Relative concentration, A=1.00	Mmg. As/gm. sap	Relative concentration, A=1.00	Mmg. As/gm. sap	Relative concentration, A=1.00	Mmg. As/gm. sap	Relative concentration, A=1.00
pH									
5.0	A	0.7	1	0.8	1	1.7	1	2.5	1
	B	.9	1.28	1.6	2	2.7	1.59	3.5	1.4
	C	.8	1.14	.87	1	.9	.53	1.1	.44
6.0	A	.63	1	.8	1	1.6	1	1.8	1
	B	.77	1.22	1.0	1.25	1.2	.75	1.3	.72
	C	.8	1.27	.77	.96	.7	.44	.8	.44
6.4	A	.32	1	.73	1	1.1	1	1.1	1
	B	.41	1.28	.59	.81	.9	.82	1.0	.91
	C	.71	2.2	.62	.85	.8	.73	.8	.73
7.0	A	.33	1	.57	1	.97	1	.93	1
	B	.54	1.63	.84	1.47	.97	1	.93	1
	C	.5	1.52	.5	1	.62	.64	.55	.58
7.5	A	.16	1	.73	1	.7	1	.66	1
	B	.48	3.00	.66	.9	.5	.72	.55	.83
	C	.45	2.8	.1	1.37	.2	.28	.23	.35
8.0	A	.30	1	.49	1	.64	1	.69	1
	B	.56	1.86	.9	1.83	.85	1.33	.75	1.1
	C	.4	1.33	.4	.82	.5	.78	.5	.72
8.4	A	.6	1	.8	1	.9	1	1.0	1
	B	.75	1.25	1.0	1.25	1.2	1.34	1.5	1.5
	C	.4	.66	.6	.75	.68	.75	.71	.71
9.0	A	.6	1	.8	1	1.0	1	1.2	1
	B	.75	1.25	1.2	1.5	1.3	1.3	2.1	1.75
	C	.5	.83	.75	.94	1.2	1.2	1.3	1.09

TABLE 4.—*Arsenic content of sap of cells treated with As_2O_3 solution*

A = Normal.
B = Previous exposure to seawater + $NaHCO_3$
C = Previous exposure to seawater + NH_4Cl.

Hours in solution		1		5		10		22	
		Mmg. As/gm. sap	Relative concentration, A = 1.00	Mmg. As/gm. sap	Relative concentration, A = 1.00	Mmg. As/gm. sap	Relative concentration, A = 1.00	Mmg. As/gm. sap	Relative concentration, A = 1.00
pH									
5.0	A	0.91	1	5.2	1	5.9	1	7.2	1
	B	2.1	2.3	5.5	1.05	6.5	1.1	8.5	1.18
	C	3.8	4.2	7.4	1.41	9.0	1.52	10.6	1.48
6.0	A	1.2	1	4.8	1	5.5	1	7.0	1
	B	1.7	1.4	5.0	1.04	6.4	1.16	8.0	1.14
	C	3.5	2.9	7.2	1.5	8.4	1.53	10.0	1.42
6.4	A	1.1	1	4.5	1	5.3	1	6.6	1
	B	1.1	1	4.8	1.07	6.0	1.13	7.0	1.06
	C	3.3	3.0	6.2	1.38	8	1.5	9.2	1.39
7.0	A	1.3	1	4	1	4.8	1	6.0	1
	B	1.2	.92	4.5	1.1	5.5	1.14	6.2	1.03
	C	2.5	1.92	5	1.25	7	1.45	9	1.5
7.5	A	1	1	3	1	4.5	1.0	5.5	1
	B	1.4	1.4	3	1	5.0	1.1	6.0	1.09
	C	2.9	2.9	3.6	1.2	5.6	1.24	7.0	1.28
8.0	A	2.4	1	3.5	1	4.4	1	6.5	1
	B	2.0	.83	3.2	.91	4.7	1.07	6.6	1
	C	2.7	1.1	4.6	1.3	7.0	1.6	7.5	1.15
8.4	A	1.6	1	3.5	1	4.6	1	7.0	1
	B	1.5	.94	3.4	.98	6.0	1.3	7.1	1
	C	2.8	1.75	6.0	1.7	7.3	1.59	9.1	1.3
9.0	A	2.7	1	4.0	1	4.5	1	7.0	1
	B	2.0	.74	4.0	1	4.0	.89	6.9	.99
	C	3.0	1.1	6.0	1.5	8.0	1.77	9.5	1.35

TABLE 5.—*Arsenic content of protoplasm of cells treated with As_2O_3 solution* [1]

A = Normal
B = With $NaHCO_3$
C = With NH_4Cl

Hours in solution		1		5		10		22	
		Mmg. As/gm. of protoplasm	Relative concentration, A = 1.00	Mmg. As/gm. of protoplasm	Relative concentration, A = 1.00	Mmg. As/gm. of protoplasm	Relative concentration, A = 1.00	Mgm. As/gm. of protoplasm	Relative concentration, A = 1.00
pH									
5.0	A	25	1	35	1	63	1	68	1
	B	45	1.8	35	1	66	1.04	80	1.18
	C	20	.8	25	.71	23	.36	23	.34
6.0	A	24	1	25	1	43	1	48	1
	B	25	1.04	30	1.2	33	.77	50	1.04
	C	19	.79	24	.96	21	.49	20	.42
6.4	A	13	1	19	1	25	1	30	1
	B	17	1.3	20	1.05	33	1.32	35	1.16
	C	13	1	16	.84	21	.84	20	.66
7.0	A	13	1	18	1	23	1	25	1
	B	16	1.23	23	1.28	25	1.09	30	1.2
	C	8	.6	12	.67	18	.78	18	.72
7.5	A	12	1	23	1	33	1	21	1
	B	12	1	25	1.09	23	.7	33	1.57
	C	6	.5	5	.22	5	.15	6	.29
8.0	A	25	1	35	1	45	1	48	1
	B	35	1.4	38	1.08	33	.73	63	1.3
	C	10	.4	21	.6	25	.56	38	.79
8.4	A	30	1	35	1	50	1	55	1
	B	38	1.26	43	1.22	38	.76	63	1.14
	C	24	.8	23	.67	30	.6	50	.91
9.0	A	33	1	40	1	58	1	58	1
	B	53	1.6	53	1.32	63	1.08	70	1.2
	C	25	.76	30	.75	50	.86	66	1.14

[1] Mmg. As/gm. of protoplasm were calculated on the basis of the observed average ratio of sap to protoplasm, which was 25.3.

TABLE 6.—*Arsenic content of protoplasm of cells treated with As_2O_3 solution* [1]

A = Normal
B = With $NaHCO_3$
C = With NH_4Cl

Hours in solution		1		5		10		22	
		Mmg. As/gm. of protoplasm	Relative concentration, A=1.00	Mmg. As/gm. of protoplasm	Relative concentration, A=1.00	Mmg. As/gm. of protoplasm	Relative concentration, A=1.00	Mmg. As/gm. of protoplasm	Relative concentration, A=1.00
pH									
5.0	A	24	1	24	1	24	1	25.3	1
	B	12.5	1.9	22	.92	28	1.16	38	1.5
	C	30	1.25	58	2.4	79	3.3	101	4.0
6.0	A	20	1	23	1	24	1	25	1
	B	12	.6	25.3	1.05	25	1.03	35	.72
	C	25	1.25	41	1.78	48	2	70	2.8
6.4	A	17	1	23	1	23	1	23	1
	B	15	.88	17.7	.77	20	.87	23	1
	C	20	1.18	19.7	.86	23	1	28	1.2
7.0	A	15	1	20	1	20	1	23	1
	B	13	.87	17.7	.88	20	1	21	.92
	C	15	1	19	.95	20	1	56	2.4
7.5	A	13	1	17.7	1	30	1	30	1
	B	15	1.15	25.3	1.42	23	.77	25	.83
	C	15	1.15	13	.73	25.3	.84	66	2.2
8.0	A	17	1	20	1	38	1	50	1
	B	13	.76	28	1.4	38	1	48	.96
	C	13	.76	14	.7	45	1.18	83	1.67
8.4	A	20	1	25	1	48	1	50	1
	B	15	.75	33	1.32	38	.79	50	1
	C	15	.75	38	1.52	73	1.52	78	1.55
9.0	A	23	1	28	1	48	1	60	1
	B	15	.65	30	1.07	40	.83	50	.83
	C	15	.65	50	1.78	76	1.58	101	1.68

[1] Mmg. As/gm. of protoplasm were calculated on the basis of the observed average ratio of sap to protoplasm, which was 25.3.

TABLE 7.—*Number of micromilligrams of arsenic in wall of cells treated with As_2O_5 solution* [1]

A = Normal.
B = Previous exposure to sea water + $NaHCO_3$.
C = Previous exposure to sea water + NH_4Cl.

Hours in solution		1	5	10	22
pH					
5.0	A	73	75	57	48
	B	32	58	38	55
	C	61	33	48	20
6.0	A	40	43	56	53
	B	40	18	0	55
	C	35	41	37	41
6.4	A	59	57	73	53
	B	28	30	0	36
	C	33	32	32	33
7.0	A	33	28	31	33
	B	38	64	35	35
	C	51	31	51	57
7.5	A	33	30	28	34
	B	25	27	26	28
	C	19	17	39	21
8.0	A	33	36	78	36
	B	21	51	52	67
	C	64	44	44	75
8.4	A	38	51	44	42
	B	26	31	60	51
	C	48	60	70	72
9.0	A	42	36	57	68
	B	39	50	70	50
	C	67	60	60	65

[1] Mmg. As/gm. of wall were calculated on the basis of the observed average ratio of sap to wall, which was 103.

TABLE 8.—*Number of micromilligrams of arsenic in wall of cells treated with As_2O_3 solution* [1]

A=Normal
B=Previous exposure to sea water+$NaHCO_3$
C=Previous exposure to sea water+NH_4Cl

Hours in solution		1	5	10	22
pH					
5.0	A	41	41	36	78
	B	36	31	31	61
	C	30	45	39	37
6.0	A	21	31	51	51
	B	28	31	31	33
	C	31	35	40	30
6.4	A	32	33	33	48
	B	38	20	35	51
	C	68	32	67	54
7.0	A	36	32	32	33
	B	34	33	42	44
	C	29	48	65	27
7.5	A	34	44	30	45
	B	36	25	30	22
	C	40	27	38	35
8.0	A	36	35	59	50
	B	35	45	36	45
	C	32	58	38	15
8.4	A	39	35	26	28
	B	38	31	30	23
	C	16	32	32	80
9.0	A	28	30	30	33
	B	31	35	28	30
	C	34	30	31	51

[1] Mmg. As/gm. of wall were calculated on the basis of the observed average ratio of sap to wall, which is 103.

TABLE 9.—*Ratios of concentration of trivalent arsenic in cells variously treated, to that of pentavalent arsenic in similarly treated cells—Average of all determinations*

pH of As solution	Sap of cells previously treated with—			Protoplasm of cells treated with—		
	Control	$NaHCO_3$	NH_4Cl	Control	$NaHCO_3$	NH_4Cl
5.0–6.0	3.65	3.35	9.04	0.57	0.54	2.52
8.0–9.0	5.78	4.08	13.40	0.83	0.69	1.00

TABLE 10.—*Ratios of concentrations of arsenic in previously treated as compared with control cells after exposure to arsenic solutions of different pH—Averages of all determinations*

Type of As	As_2O_3		As_2O_3	
Previous treatment	$NaHCO_3$	NH_4Cl	$NaHCO_3$	NH_4Cl
Sap	1.09	1.66	1.32	0.92
Protoplasm	0.98	1.51	1.16	0.65

Examination for Entrance into the Regular Corps of the United States Public Health Service

Examinations of candidates for entrance into the regular corps of the United States Public Health Service will be held at the following-named places on the dates specified:

Washington, D. C., March 2, 1925.
Chicago, Ill., March 2, 1925.
New Orleans, La., March 2, 1925.
San Francisco, Calif., March 2, 1925.

Candidates must be not less than 23 nor more than 32 years of age, and they must have been graduated in medicine at some reputable medical college, and have had one year's hospital experience or two years' professional practice. They must pass satisfactorily oral, written, and clinical tests before a board of medical officers and must undergo a physical examination.

Successful candidates will be recommended for appointment by the President, with the advice and consent of the Senate.

Requests for information or permission to take this examination should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C.

MORTALITY SUMMARY FOR 76 LARGE CITIES

Deaths from all causes, death rates, and infant mortality in 76 large cities of the United States for 1924 and comparison with 1923

[From the Weekly Health Index, Bureau of the Census, Department of Commerce]

City [1]	Total deaths	Death rate [2]	Deaths under 1 year	Provisional infant mortality rate 1924 [3]	Infant mortality rate 1923	Mortality data for calendar year, 1923		
						Total deaths	Death rate	Deaths under 1 year
Total (65 cities)	336,229	12.5	42,548	[4] 71	[4] 77	344,048	13.0	44,894
Akron [5]	1,512	----	273	58	66	1,702	----	323
Albany	1,816	15.4	173	74	90	1,899	16.2	206
Atlanta [6]	4,109	18.1	546	----	----	4,025	18.1	613
Baltimore	11,176	14.3	1,469	83	86	11,589	15.0	1,500
Birmingham [6]	3,331	16.7	468	----	----	3,053	15.6	469
Boston	10,858	14.1	1,446	74	82	11,509	14.9	1,571
Bridgeport [5]	1,514	----	181	55	80	1,642	----	261
Buffalo	6,913	12.7	1,074	84	90	7,269	13.5	1,110
Cambridge	1,425	12.8	164	54	72	1,527	13.7	219
Camden	1,726	13.7	291	92	89	1,806	14.5	282
Canton	1,017	10.0	191	78	62	1,030	10.4	148
Chicago	32,647	11.2	4,484	76	87	33,764	11.7	4,885
Cincinnati	6,158	15.2	671	76	80	6,527	16.1	666
Cleveland	9,218	10.2	1,360	65	67	9,593	10.8	1,383
Columbus	3,513	13.2	358	65	76	3,983	15.3	416
Dallas [6]	2,404	12.9	306	----	----	2,173	11.9	375
Dayton	1,820	10.8	235	73	79	1,950	11.8	249
Denver [5] [6]	4,104	----	513	----	----	3,997	----	473
Des Moines	1,586	11.0	135	45	----	1,601	11.4	194
Detroit [5]	12,747	----	2,357	77	87	13,051	----	2,442
Duluth	1,010	9.4	135	55	73	1,075	10.1	174
Erie [5]	1,270	----	168	63	68	1,347	----	171
Fall River	1,579	13.1	334	93	92	1,655	13.7	337
Flint [5]	945	----	223	71	98	1,285	----	299
Fort Worth	1,283	8.7	156	----	----	1,197	8.3	159
Grand Rapids	1,516	10.3	167	50	63	1,714	11.7	210

[1] Cities appearing in the summary are those shown for the 52 weeks in the Weekly Health Index.
[2] Allowance has been made for the two extra days, which must be added to the 52 weeks to give a period of 366 days.
[3] Infant mortality rate is based upon deaths under 1 year as returned each week and estimated births, 1924.
[4] Infant mortality rate for the cities in the birth registration area, appearing in the summary.
[5] Mortality rates are omitted, pending the establishment of more satisfactory estimates of population.
[6] Cities for which no infant mortality rate is given are not in the registration area for births.

Deaths from all causes, death rates, and infant mortality in 76 large cities of the United States for 1924 and comparison with 1923—Continued

City	Total deaths	Death rate	Deaths under 1 year	Provisional infant mortality rate 1924	Infant mortality rate 1923	Mortality data for calendar year, 1923		
						Total deaths	Death rate	Deaths under 1 year
Houston [5] [6]	2,181		291			2,058		257
Indianapolis	4,581	13.1	546	73	86	4,926	14.4	612
Jacksonville, Fla	1,785	17.5	221	95		1,726	17.3	209
Jersey City	3,985	12.8	558	75	76	3,708	12.0	538
Kansas City, Kans	1,530	12.6	185	75	97	1,727	14.9	263
Kansas City, Mo. [6]	4,785	13.4	603			5,057	14.4	632
Los Angeles [5]	11,300		1,226	66	72	10,750		1,210
Louisville	3,877	15.1	425	72	90	4,186	16.2	506
Lowell	1,543	13.4	276	93	107	1,680	14.6	311
Lynn	1,128	10.9	123	63	79	1,201	11.7	156
Memphis [6]	3,430	20.0	429			3,388	19.9	422
Milwaukee	4,716	9.6	753	66	79	5,227	10.8	866
Minneapolis [7]	4,641	11.2	495	51	54	4,553	11.1	526
Nashville [6]	2,340	19.1	292			2,281	18.6	255
New Bedford	1,326	10.1	246	79	106	1,584	12.2	349
New Haven	2,111	12.1	288	72	74	2,181	12.6	294
New Orleans [6]	7,531	18.5	836			7,157	17.7	763
New York	70,623	11.8	8,733	67	67	69,552	11.7	8,578
Bronx Borough	8,001	9.2	771	51	56	7,586	9.0	836
Brooklyn Borough	23,513	10.8	3,158	64	60	23,947	11.1	2,932
Manhattan Borough	31,367	13.9	3,977	77	76	30,376	13.4	3,936
Queens Borough	5,592	10.1	629	60	67	5,960	11.1	696
Richmond Borough	2,150	16.5	198	69	62	1,683	13.2	178
Newark, N. J	4,906	11.1	726	64	68	5,110	11.6	752
Norfolk	1,702	10.4	215	74	57	1,825	11.5	284
Oakland	2,738	11.2	292	66	63	2,604	10.8	261
Oklahoma City [6]	1,139	11.0	155			1,275	12.6	155
Omaha	2,609	12.6	315	58	71	2,696	13.2	348
Paterson	1,680	12.0	195	63	68	1,825	13.1	207
Philadelphia	25,151	13.0	3,049	74	80	26,628	13.8	3,251
Pittsburgh	9,456	15.2	1,357	92	98	9,821	15.8	1,509
Portland, Oreg	3,167	11.5	268	53	53	3,052	11.2	266
Providence	3,452	14.2	516	79	85	3,578	14.8	541
Richmond	2,782	15.2	370	87	110	2,833	15.6	473
St. Louis [5]	10,896	13.5	955			10,924	13.6	1,063
St. Paul	2,844	11.7	291	48	66	3,116	12.9	405
Salt Lake City	1,661	13.0	210	63	62	1,562	12.4	206
San Antonio [6]	3,002	15.8	587			2,728	14.8	529
San Francisco	7,431	13.6	489	54	58	7,318	13.6	504
Schenectady	995	10.0	120	65	69	1,024	10.4	122
Seattle [5]	3,279		242	48	50	3,017		266
Somerville	972	9.7	104	54	70	1,105	11.2	137
Spokane [5]	1,301		113	47	48	1,225		114
Springfield, Mass	1,687	11.4	235	68	71	1,719	11.9	239
Syracuse	2,235	11.9	278	67	83	2,392	13.0	347
Tacoma	1,095	10.7	119	55	48	1,113	10.9	105
Toledo	3,258	11.7	392	68	74	3,391	12.6	412
Trenton	1,962	15.2	284	89	78	1,781	14.0	245
Utica	1,299	12.4	151	60	81	1,591	15.4	194
Washington, D. C	6,496	13.4	707	77	92	7,105	14.9	827
Waterbury [5]	1,002		180	77	89	1,122		200
Wilmington, Del	1,382	11.6	199	87	99	1,550	13.2	230
Worcester	2,419	12.4	242	54	76	2,521	13.1	344
Yonkers	1,092	10.0	175	74	59	1,091	10.1	140
Youngstown	1,684	10.9	290	71	87	1,697	11.3	332

[5] Mortality rates are omitted, pending the establishment of more satisfactory estimates of population.
[6] Cities for which no infant mortality sate is given are not in the registration area for births.
[7] Minneapolis reported 122 deaths from smallpox for the four weeks ending Dec. 27, 1924.

DEATHS DURING WEEK ENDED JANUARY 3, 1925

Summary of information received by telegraph from industrial insurance companies for week ended January 3, 1925, and corresponding week of 1924. (From the Weekly Health Index, January 8, 1925, issued by the Bureau of the Census, Department of Commerce)

	Week ended Jan. 3, 1925	Corresponding week 1924
Policies in force	58,136,497	54,449,109
Number of death claims	10,615	9,184
Death claims per 1,000 policies in force, annual rate	9.5	8.8

Deaths from all causes in certain large cities of the United States during the week ended January 3, 1925, infant mortality, annual death rate, and comparison with corresponding week of 1924. (From the Weekly Health Index, January 8, 1925, issued by the Bureau of the Census, Department of Commerce)

City	Week ended Jan. 3, 1925		Annual death rate per 1,000 corresponding week, 1924	Deaths under 1 year		Infant mortality rate, week ended Jan. 3, 1925 [2]
	Total deaths	Death rate [1]		Week ended Jan. 3, 1925	Corresponding week, 1924	
Total (64 cities)	7,629	14.5	[3] 13.0	939	[3] 807	----------
Akron	27	----------	----------	6	3	66
Albany [4]	35	15.2	11.9	2	4	44
Atlanta	80	17.9	14.7	12	9	----------
Baltimore [4]	254	16.6	14.1	21	30	61
Birmingham	82	20.8	14.0	15	5	----------
Boston	247	16.4	17.5	45	32	119
Bridgeport	39	----------	----------	8	7	127
Buffalo	136	12.8	13.5	12	16	49
Cambridge	24	11.1	17.7	5	8	86
Camden	44	17.8	15.7	8	8	131
Chicago [4]	781	13.6	11.9	106	89	94
Cincinnati	129	16.4	17.8	15	5	89
Cleveland	214	11.9	11.3	26	26	65
Columbus	90	17.1	14.4	10	10	94
Dallas	59	15.9	13.0	4	7	----------
Dayton	37	11.2	12.3	1	4	16
Denver	83	----------	----------	11	15	----------
Des Moines	31	10.8	14.4	0	0	0
Detroit	207	----------	----------	61	50	103
Duluth	11	5.2	7.2	0	1	0
Erie	35	----------	----------	4	3	78
Fall River [4]	35	15.1	10.3	4	5	58
Flint	17	----------	----------	5	0	82
Fort Worth	28	9.6	9.5	4	4	----------
Grand Rapids	36	12.5	10.9	3	3	47
Houston	60	----------	----------	7	3	----------
Indianapolis	100	14.5	10.5	10	10	69
Jacksonville, Fla	47	23.4	16.8	6	5	133
Jersey City	89	14.7	14.4	14	15	98
Kansas City, Kans	46	19.4	11.6	4	2	84
Kansas City, Mo	103	14.6	14.8	12	14	----------
Los Angeles	266	----------	----------	22	15	61
Louisville	92	18.5	15.5	10	13	87
Lowell	24	10.7	13.5	5	6	87
Lynn	28	13.9	14.6	0	3	0
Memphis	82	24.5	20.0	5	9	----------
Milwaukee	105	10.9	5.8	29	8	133
Minneapolis	111	13.6	10.1	10	10	53
Nashville	47	19.7	14.8	8	3	----------
New Bedford	33	12.7	10.6	4	8	66
New Haven	45	13.1	11.6	3	3	39
New Orleans	181	22.8	17.8	25	15	----------
New York	1,582	13.5	12.1	188	167	75
Bronx Borough	174	10.1	8.9	22	16	76
Brooklyn Borough	507	11.8	10.7	61	52	64
Manhattan Borough	686	15.8	15.0	77	82	77
Queens Borough	161	14.6	10.0	23	16	114
Richmond Borough	54	21.0	14.4	5	1	90
Newark, N. J	113	13.0	11.9	24	26	109
Norfolk	38	11.7	11.4	4	2	71
Oakland	61	12.5	11.2	5	8	59
Omaha	54	13.3	11.8	15	2	144
Paterson	42	15.5	10.4	3	3	50
Philadelphia	597	15.7	14.7	89	69	112
Pittsburgh	224	18.5	10.3	30	10	105
Portland, Oreg	89	16.4	14.3	8	7	83
Providence	73	15.5	13.5	3	5	24
Richmond	45	12.6	17.6	6	7	73
Rochester	82	12.9	----------	5	----------	40
St. Louis	245	15.6	13.5	18	13	----------
St. Paul	61	12.9	10.5	7	9	60
Salt Lake City [4]	37	14.7	17.4	6	8	94
San Antonio	66	17.4	11.4	13	6	----------

[1] Annual rate per 1,000 population.
[2] Deaths under 1 year per 1,000 births—an annual rate based on deaths under 1 year for the week and estimated births for 1924. Cities left blank are not in the registration area for births.
[3] Data for 63 cities.
[4] Deaths for week ended Friday, Jan. 2, 1925.

Deaths from all causes in certain large cities of the United States during the week ended January 3, 1925, infant mortality, annual death rate, and comparison with corresponding week of 1924. (From the Weekly Health Index, January 8, 1925, issued by the Bureau of the Census, Department of Commerce)—Continued

City	Week ended Jan. 3, 1925		Annual death rate per 1,000 corresponding week, 1924	Deaths under 1 year		Infant mortality rate, week ended Jan. 3, 1925
	Total deaths	Death rate		Week ended Jan. 3, 1925	Corresponding week, 1924	
San Francisco	178	16.6	17.4	9	6	52
Schenectady	18	9.2	10.9	1	6	28
Seattle	74			5	9	51
Somerville	24	12.3	12.5	6	2	161
Spokane	29			1	1	22
Springfield, Mass	27	9.2	13.0	3	4	45
Syracuse	47	12.8	13.6	11	8	138
Tacoma	23	11.5	16.7	2	6	48
Toledo	78	14.2	11.2	9	4	81
Trenton	47	18.6	12.9	11	1	179
Utica	21	10.2	15.8	2	0	41
Washington, D.C	141	14.8	11.6	8	16	45
Waterbury	20			3	4	66
Wilmington, Del	33	14.1	9.6	6	4	137
Worcester	57	14.9	13.9	8	5	92
Yonkers	20	9.3	12.8	0	5	0
Youngstown	20	6.5	18.5	1	8	13

DEATHS DURING WEEK ENDED JANUARY 10, 1925

Summary of information received by telegraph from industrial insurance companies for week ended January 10, 1925, and corresponding week of 1924. (From the Weekly Health Index, January 14, 1925, issued by the Bureau of the Census, Department of Commerce)

	Week ended Jan. 10, 1925	Corresponding week, 1924
Policies in force	58, 318, 201	54, 575, 083
Number of death claims	11, 695	10, 542
Death claims per 1,000 policies in force, annual rate	10.5	10.1

Deaths from all causes in certain large cities of the United States during the week ended January 10, 1925, infant mortality, annual death rate, and comparison with corresponding week of 1924. (From the Weekly Health Index, January 14, 1925, issued by the Bureau of the Census, Department of Commerce)

City	Week ended Jan. 10, 1925		Annual death rate per 1,000 corresponding week, 1924	Deaths under 1 year		Infant mortality rate, week ended Jan. 10, 1925 [2]
	Total deaths	Death rate [1]		Week ended Jan. 10, 1925	Corresponding week, 1924	
Total (63 cities)	7,686	14.7	[3] 14.1	853	[3] 837	
Akron	37			8	6	88
Albany [4]	39	17.0	13.2	1	0	22
Atlanta	76	17.0	23.1	14	17	
Baltimore [4]	305	20.0	16.9	21	35	61
Birmingham	82	20.8	14.0	14	6	
Boston	255	17.0	15.1	45	35	119
Bridgeport	36			0	5	0
Buffalo	159	15.0	16.1	17	23	69
Cambridge	36	16.7	15.8	0	6	0

[1] Annual rate per 1,000 population.
[2] Deaths under 1 year per 1,000 births—an annual rate based on deaths under 1 year for the week and estimated births for 1924. Cities left blank are not in the registration area for births.
[3] Data for 62 cities.
[4] Deaths for week ended Friday, Jan. 9, 1925.

Deaths from all causes in certain large cities of the United States during the week ended January 10, 1925, infant mortality, annual death rate, and comparison with corresponding week of 1924. (From the Weekly Health Index, January 14, 1925, issued by the Bureau of the Census, Department of Commerce)—Continued

City	Week ended Jan. 10, 1925		Annual death rate per 1,000 corresponding week, 1924	Deaths under 1 year		Infant mortality rate, week ended Jan. 10, 1925
	Total deaths	Death rate		Week ended Jan. 10, 1925	Corresponding week, 1924	
Camden	38	15.4	11.6	4	4	66
Chicago [1]	822	14.3	14.4	115	98	102
Cincinnati	134	17.1	15.1	14	7	83
Cleveland	187	10.4	11.2	24	26	60
Columbus	83	15.8	13.0	7	6	66
Dallas	41	11.1	13.0	7	5	
Dayton	38	11.5	12.9	2	1	32
Denver	81			8	11	
Des Moines	32	11.2	13.3	2	4	34
Detroit	260			49	57	83
Duluth	25	11.8	10.6	2	3	42
Erie	29			6	3	117
Fall River [1]	31	13.3	12.1	3	5	43
Flint	17			1	5	16
Fort Worth	32	10.9	9.9	5	5	
Grand Rapids	37	12.8	13.0	2	4	31
Houston	51			5	6	
Indianapolis	98	14.2	13.2	5	9	34
Jacksonville, Fla	47	23.4	17.3	2	1	44
Jersey City	90	14.9	16.9	12	12	84
Kansas City, Kans	37	15.6	15.0	4	5	84
Kansas City, Mo	93	13.2	17.5	2	11	
Los Angeles	263			36	30	100
Louisville	75	15.1	21.0	12	13	105
Lowell	33	14.8	15.8	8	10	139
Lynn	26	12.9	13.1	3	4	80
Memphis	68	20.3	15.4	1	4	
Milwaukee	110	11.4	9.8	15	11	69
Minneapolis	103	12.6	12.7	12	9	64
Nashville [1]	45	18.9	24.9	7	5	
New Bedford	18	6.9	8.7	1	6	17
New Haven	43	12.5	13.6	4	6	52
New Orleans	144	18.1	19.7	16	11	
New York	1,660	14.2	13.0	186	191	74
Bronx Borough	189	10.9	8.4	21	15	73
Brooklyn Borough	522	12.2	12.5	65	74	68
Manhattan Borough	754	17.4	15.4	72	81	72
Queens Borough	139	12.6	10.2	22	11	109
Richmond Borough	56	21.8	20.7	6	10	108
Newark, N. J	151	17.4	9.0	27	8	123
Norfolk	44	13.6	8.6	2	1	36
Oakland	64	13.2	12.2	3	5	35
Omaha	34	8.4	12.8	1	8	10
Paterson	56	20.6	14.8	4	7	67
Philadelphia	620	16.3	15.1	67	70	84
Pittsburgh	165	13.6	15.5	22	23	77
Portland, Oreg	68	12.6	13.9	1	9	10
Providence	59	12.6	10.9	8	3	64
Richmond	52	14.5	20.7	7	4	85
Rochester	74	11.6		6		47
St. Louis	287	18.2	15.7	28	17	
St. Paul	47	10.0	13.9	7	6	60
Salt Lake City [1]	34	13.5	13.4	4	1	63
San Antonio	69	18.2	18.0	8	6	
San Francisco	188	17.6	16.5	12	4	69
Schenectady	19	9.7	8.3	2	3	56
Seattle	65			2	3	20
Somerville	19	9.7	7.8	2	1	54
Spokane	30			2	0	44
Springfield, Mass	37	12.6	16.9	5	7	74
Syracuse	44	12.0	10.0	6	4	75
Tacoma	34	17.0	10.1	2	3	48
Toledo	72	13.1	15.4	7	10	63
Trenton	59	23.3	20.9	7	8	114
Utica	29	14.1	12.9	0	6	0
Washington, D. C	127	13.3	14.5	10	11	56
Waterbury	21			4	6	88
Wilmington, Del	36	15.4	15.2	7	9	160
Yonkers	23	10.7	6.7	5	2	110
Youngstown	33	10.8	10.4	4	3	51

[1] Deaths for week ended Friday, Jan. 9, 1925.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Week Ended January 17, 1925

ALABAMA	Cases
Chicken pox	58
Dengue	1
Diphtheria	34
Dysentery	3
Hiccough (epidemic)	(1)
Influenza	277
Lethargic encephalitis	2
Malaria	14
Measles	20
Mumps	87
Ophthalmia neonatorum	1
Pellagra	3
Pneumonia	134
Scarlet fever	25
Smallpox	205
Trachoma	6
Tuberculosis	33
Typhoid fever	13
Whooping cough	23

ARIZONA	
Chicken pox	10
Diphtheria	2
Measles	55
Mumps	42
Scarlet fever	7
Smallpox	27
Tuberculosis	52
Typhoid fever	1
Whooping cough	1

ARKANSAS	
Cerebrospinal meningitis	1
Chicken pox	33
Diphtheria	9
Influenza	218
Malaria	25

ARKANSAS—continued	Cases
Measles	49
Mumps	30
Pellagra	9
Scarlet fever	13
Smallpox	11
Trachoma	2
Tuberculosis	11
Typhoid fever	10
Whooping cough	27

CALIFORNIA	
Cerebrospinal meningitis:	
Berkeley	1
San Diego	1
Diphtheria	130
Influenza	22
Measles	52
Plague—Los Angeles	1
Poliomyelitis:	
Alameda	1
Ventura County	1
Scarlet fever	159
Smallpox:	
Los Angeles	46
Oakland	16
Sacramento	9
San Diego	10
Butte County	10
Los Angeles County	39
Orange County	8
Scattering	42
Typhoid fever	6

CONNECTICUT	
Cerebrospinal meningitis	1
Chicken pox	132
Conjunctivitis (infectious)	1

[1] Reported in six counties.

Reports for Week Ended January 17, 1925—Continued

CONNECTICUT—continued

	Cases
Diphtheria	70
Dysentery (amebic)	1
German measles	32
Influenza	5
Jaundice	1
Lethargic encephalitis	2
Measles	44
Mumps	63
Pneumonia (all forms)	107
Poliomyelitis	1
Scarlet fever	179
Septic sore throat	6
Trachoma	1
Trichinosis	3
Tuberculosis (all forms)	34
Typhoid fever	3
Whooping cough	61

DELAWARE

Chicken pox	4
Diphtheria	1
Influenza	1
Measles	1
Mumps	5
Pneumonia	1
Scarlet fever	2
Tuberculosis	6
Whooping cough	1

DISTRICT OF COLUMBIA

Cerebrospinal meningitis	1
Chicken pox	37
Diphtheria	12
Influenza	4
Lethargic encephalitis	1
Measles	4
Pneumonia	46
Scarlet fever	35
Smallpox	7
Tuberculosis	21
Typhoid fever	6
Whooping cough	11

FLORIDA

Diphtheria	9
Influenza	49
Malaria	5
Pneumonia	13
Scarlet fever	3
Smallpox	1
Typhoid fever	12

GEORGIA

Cerebrospinal meningitis	1
Chicken pox	33
Diphtheria	48
Hookworm disease	5
Influenza	44
Malaria	1
Measles	1
Mumps	88
Pellagra	1
Pneumonia	48
Poliomyelitis	1

GEORGIA—continued

	Cases
Scarlet fever	12
Smallpox	9
Tetanus	1
Tuberculosis	18
Typhoid fever	4
Whooping cough	7

ILLINOIS

Diphtheria:	
Cook County	88
Sangamon County	8
Scattering	38
Influenza	23
Lethargic encephalitis—Cook County	2
Measles	288
Pneumonia	362
Scarlet fever:	
Cook County	292
Madison County	14
Morgan County	13
Peoria County	10
St. Clair County	23
Sangamon County	9
Will County	9
Scattering	101
Smallpox:	
St. Clair County	14
Scattering	29
Tuberculosis	208
Typhoid fever	33
Whooping cough	257

INDIANA

Chicken pox	237
Diphtheria	46
Influenza	75
Measles	86
Mumps	9
Ophthalmia neonatorum	1
Pneumonia	26
Scarlet fever:	
Allen County	17
Bartholomew County	11
Dekalb County	8
Elkhart County	10
Kosciusko County	14
La Porte County	8
St. Joseph County	16
Scattering	74
Smallpox:	
Clay County	49
Marion County	22
Tipton County	14
Tippecanoe County	10
Vigo County	21
Wabash County	12
Scattering	30
Tuberculosis	26
Typhoid fever	15
Whooping cough	26

IOWA

Diphtheria	19
Scarlet fever	72
Smallpox	73

Reports for Week Ended January 17, 1925—Continued

KANSAS

	Cases
Cerebrospinal meningitis	3
Chicken pox	118
Diphtheria	32
Influenza	23
Measles	5
Mumps	297
Pneumonia	42
Poliomyelitis	1
Scarlet fever	99
Smallpox	5
Tuberculosis	65
Typhoid fever	3
Whooping cough	23

LOUISIANA

Diphtheria	23
Influenza	31
Leprosy	2
Malaria	4
Pneumonia	73
Scarlet fever	15
Smallpox	41
Tuberculosis	28
Typhoid fever	5
Whooping cough	6

MAINE

Chicken pox	34
Diphtheria	6
German measles	1
Influenza	8
Measles	16
Mumps	100
Pneumonia	11
Poliomyelitis	3
Scarlet fever	30
Septic sore throat	1
Tuberculosis	6
Typhoid fever	6
Vincent's angina	1
Whooping cough	40

MARYLAND[2]

Cerebrospinal meningitis	1
Chicken pox	73
Diphtheria	31
German measles	2
Influenza	200
Lethargic encephalitis	2
Measles	38
Mumps	31
Ophthalmia neonatorum	1
Paratyphoid fever	1
Pneumonia (all forms)	163
Poliomyelitis	2
Scarlet fever	95
Septic sore throat	9
Tetanus	1
Tuberculosis	46
Typhoid fever	5
Vincent's angina	1
Whooping cough	66

[2] Week ended Friday.

MASSACHUSETTS

	Cases
Anthrax	3
Cerebrospinal meningitis	3
Chicken pox	334
Conjunctivitis (suppurative)	13
Diphtheria	152
German measles	106
Influenza	13
Lethargic encephalitis	4
Measles	248
Mumps	106
Ophthalmia neonatorum	22
Pneumonia (lobar)	147
Poliomyelitis	2
Scarlet fever	389
Septic sore throat	3
Tuberculosis (all forms)	149
Typhoid fever	14
Whooping cough	102

MICHIGAN

Diphtheria	127
Measles	166
Pneumonia	130
Scarlet fever	334
Smallpox	42
Tuberculosis	79
Typhoid fever	12
Whooping cough	113

MINNESOTA

Chicken pox	141
Diphtheria	63
Lethargic encephalitis	1
Measles	13
Pneumonia	2
Scarlet fever	264
Smallpox	69
Tuberculosis	37
Typhoid fever	4
Whooping cough	38

MISSISSIPPI

Diphtheria	13
Poliomyelitis	1
Scarlet fever	9
Smallpox	25
Typhoid fever	12

MISSOURI

(Exclusive of Kansas City)

Chicken pox	58
Diphtheria	69
Influenza	120
Malaria	2
Measles	5
Mumps	19
Ophthalmia neonatorum	2
Pneumonia	1
Scarlet fever	148
Septic sore throat	1
Smallpox	20
Trachoma	9
Tuberculosis	29
Typhoid fever	3
Whooping cough	7

Reports for Week Ended January 17, 1925—Continued

MONTANA

	Cases
Diphtheria	13
Scarlet fever	46
Smallpox	20

NEW JERSEY

Chicken pox	284
Diphtheria	137
Influenza	22
Measles	135
Paratyphoid fever	1
Pneumonia	231
Poliomyelitis	1
Scarlet fever	259
Smallpox	5
Trachoma	2
Typhoid fever	17
Whooping cough	284

NEW MEXICO

Chicken pox	19
Diphtheria	5
Influenza	15
Measles	43
Mumps	3
Pneumonia	18
Scarlet fever	11
Septic sore throat	5
Tuberculosis	17
Whooping cough	1

NEW YORK [3]

(Exclusive of New York City)

Cerebrospinal meningitis	2
Diphtheria	96
Influenza	94
Lethargic encephalitis	8
Measles	201
Pneumonia	304
Poliomyelitis	2
Scarlet fever	358
Smallpox	17
Typhoid fever	35
Whooping cough	231

NORTH CAROLINA

Cerebrospinal meningitis	3
Chicken pox	166
Diphtheria	41
German measles	1
Measles	19
Scarlet fever	32
Septic sore throat	7
Smallpox	63
Typhoid fever	2
Whooping cough	99

OKLAHOMA

(Exclusive of Oklahoma City and Tulsa)

Diphtheria	10
Smallpox	5
Typhoid fever	12

OREGON

	Cases
Cerebrospinal meningitis	1
Chicken pox	53
Diphtheria:	
Portland	20
Scattering	18
Influenza	8
Lethargic encephalitis	2
Measles	6
Mumps	30
Pneumonia	[4] 10
Scarlet fever:	
Portland	11
Scattering	20
Smallpox:	
Portland	32
Scattering	14
Tuberculosis	11
Whooping cough	3

SOUTH DAKOTA

Chicken pox	14
Diphtheria	14
Measles	3
Mumps	2
Pneumonia	2
Rocky Mountain spotted fever	1
Scarlet fever	46
Smallpox	3
Typhoid fever	9
Whooping cough	1

TEXAS

Cerebrospinal meningitis	1
Chicken pox	58
Dengue	1
Diphtheria	45
Dysentery (epidemic)	1
Influenza	419
Measles	37
Mumps	82
Pneumonia	27
Scarlet fever	19
Smallpox	9
Typhoid fever	4
Tuberculosis	33
Whooping cough	3

VERMONT

Chicken pox	59
Mumps	34
Scarlet fever	12
Whooping cough	14

VIRGINIA

Cerebrospinal meningitis—Augusta County	1

WASHINGTON

Chicken pox	108
Diphtheria	32
Lethargic encephalitis	1
Measles	42

[3] Figures include Rochester reports for two weeks.

[4] Deaths.

Reports for Week Ended January 17, 1925—Continued

WASHINGTON—continued

	Cases
Mumps	86
Pneumonia	1
Poliomyelitis—San Juan County	3
Scarlet fever	52
Smallpox	38
Tuberculosis	39
Whooping cough	21

WEST VIRGINIA

Diphtheria	12
Scarlet fever	17
Smallpox	8
Typhoid fever	2

WISCONSIN

Milwaukee:	
Cerebrospinal meningitis	1
Chicken pox	63
Diphtheria	19
German measles	121
Influenza	1
Measles	219
Mumps	70
Pneumonia	2
Poliomyelitis	1
Scarlet fever	10
Smallpox	2
Tuberculosis	8

WISCONSIN—continued

	Cases
Typhoid fever	1
Whooping cough	26
Scattering:	
Chicken pox	305
Diphtheria	32
German measles	9
Influenza	23
Lethargic encephalitis	2
Measles	91
Mumps	341
Pneumonia	20
Scarlet fever	168
Smallpox	84
Tuberculosis	23
Typhoid fever	4
Whooping cough	61

WYOMING

Chicken pox	14
Diphtheria	1
Measles	1
Mumps	1
Pneumonia	5
Scarlet fever	7
Small pox	2
Tuberculosis	2
Typhoid fever	1

Reports for Week Ended January 10, 1925

DISTRICT OF COLUMBIA

	Cases
Chicken pox	48
Diphtheria	26
Influenza	2
Measles	21
Pneumonia	31
Scarlet fever	14
Smallpox	1
Tuberculosis	22
Typhoid fever	15
Whooping cough	17

NEBRASKA

Chicken pox	47
Diphtheria	5
German measles	1
Lethargic encephalitis	1
Measles	2
Mumps	7

NEBRASKA—continued

	Cases
Pneumonia	4
Scarlet fever	25
Smallpox	26
Typhoid fever	1
Whooping cough	3

NORTH DAKOTA

Chicken pox	33
Diphtheria	11
German measles	2
Measles	7
Mumps	33
Pneumonia	5
Scarlet fever	57
Smallpox	15
Tuberculosis	5
Typhoid fever	3
Whooping cough	10

23312°—25†——3

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week:

State	Cerebrospinal meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
November, 1924										
District of Columbia	0	56	5	------	2	0	2	74	1	7
December, 1924										
District of Columbia	0	62	11	------	16	0	0	173	0	35
Massachusetts	2	677	73	2	674	------	13	1,411	------	73
Missouri	3	131	65	0	22	0	0	937	43	24
New Jersey	9	519	94	------	336	------	2	811	11	122
Vermont	------	25	------	------	44	------	------	93	------	5
West Virginia	4	120	128	------	79	------	------	213	47	39

PLAGUE-ERADICATIVE MEASURES IN THE UNITED STATES

Los Angeles, Calif.—During the week ended January 3, 1925, plague infection was found in three rodents at Los Angeles, Calif.

Oakland, Calif.—No plague infection was found in Oakland, Calif., during the week ended January 3, 1925.

New Orleans, La.—The following items are taken from the report of plague-eradicative measures in New Orleans, La., for the week ended January 3, 1925:

Number of inspections of vessels for rat guards	1,025
Number of vessels fumigated with cyanide gas	31
Number of rodents examined for plague	3,306
Number of rodents found plague infected	0

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

Diphtheria.—For the week ended January 3, 1925, 35 States reported 1,632 cases of diphtheria. For the week ended January 5, 1924, the same States reported 2,669 cases of this disease. One hundred and five cities, situated in all parts of the country and having an aggregate population of nearly 28,900,000, reported 876 cases of diphtheria for the week ended January 3, 1925. Last year, for the corresponding week, they reported 1,339 cases. The estimated expectancy for these cities was 1,321 cases of diphtheria. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Measles.—Thirty States reported 1,560 cases of measles for the week ended January 3, 1924, and 10,793 cases of this disease for the week ended January 5, 1924. One hundred and five cities reported 868 cases for the week this year and 4,008 cases last year.

Scarlet fever.—Scarlet fever was reported for the week as follows: Thirty-five States—this year, 3,433; last year, 3,442 cases. One hundred and five cities—this year, 1,638 cases; last year, 1,550 cases; estimated expectancy, 1,004 cases.

Smallpox.—For the week ended January 3, 1925, 35 States reported 759 cases of smallpox. Last year, for the corresponding week, they reported 807 cases of smallpox. One hundred and five cities reported smallpox for the week as follows: 1925, 241 cases; 1924, 178 cases; estimated expectancy, 71 cases. Twenty-one deaths from smallpox for the week this year were reported at Minneapolis.

Typhoid fever.—Four hundred and forty-eight cases of typhoid fever were reported for the week ended January 3, 1925, by 34 States. For the corresponding week of 1924 the same States reported 243 cases. One hundred and five cities reported 203 cases of typhoid fever for the week this year and 63 cases for the week last year. The estimated expectancy for these cities was 36 cases.

Influenza and pneumonia.—Deaths from influenza and pneumonia (combined) were reported for the week by 105 cities as follows: 1925, 1,198 deaths; 1924, 898 deaths.

City reports for week ended January 3, 1925

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence how many cases of the disease under consideration may be expected to occur during a certain week in the absence of epidemics. It is based on reports to the Public Health Service during the past nine years. It is in most instances the median number of cases reported in the corresponding week of the preceding years. When the reports include several epidemics, or when for other reasons the median is unsatisfactory, the epidemic periods are excluded and the estimated expectancy is the mean number of cases reported for the week during nonepidemic years.

If reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1915 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviations from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported	Scarlet fever	
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported				Cases, estimated expectancy	Cases reported
NEW ENGLAND										
Maine:										
Lewiston	------	1	0	0	0	0	------	0	1	2
Portland	21	2	0	4	0	1	48	0	2	0
New Hampshire:										
Concord	0	1	0	0	0	0	0	0	1	2
Nashua	1	0	1	0	0	10	0	1	1	1
Vermont:										
Barre	0	0	0	0	0	0	3	0	1	4
Burlington	3	1	0	0	0	0	0	3	2	0
Massachusetts:										
Boston	56	7	52	1	1	69	9	40	47	134
Fall River	0	5	5	3	0	0	0	5	3	2
Springfield	1	5	2	0	0	73	9	2	7	45
Worcester	8	5	3	0	0	1	0	3	10	5
Rhode Island:										
Pawtucket	0	2	2	0	0	0	0	0	1	3
Providence	0	13	13	3	0	2	0	10	9	4
Connecticut:										
Bridgeport	0	8	11	1	0	0	0	4	5	15
Hartford	8	9	14	0	0	0	5	1	7	7
New Haven	21	6	2	0	0	7	0	5	6	24

City reports for week ended January 3, 1925—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported	Scarlet fever	
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported				Cases, estimated expectancy	Cases reported
MIDDLE ATLANTIC										
New York:										
Buffalo	17	30	5	0	3	74	8	10	22	15
New York	149	228	153	29	24	30	19	257	154	248
Rochester	0	13	0	0	0	7	24	6	11	49
Syracuse	4	10	6	0	0	1	4	3	13	7
New Jersey:										
Camden	8	4	5	0	0	15	1	13	2	6
Newark	18	22	11	11	1	32	2	21	18	35
Trenton	1	8	4	2	1	4	0	5	2	2
Pennsylvania:										
Philadelphia	97	79	64	----	11	28	20	90	53	116
Pittsburgh	45	29	27	----	2	48	28	41	25	86
Reading	9	6	2	0	0	0	5	0	1	1
Scranton	0	5	3	0	0	1	0	6	3	1
E. NORTH CENTRAL										
Ohio:										
Cincinnati	13	18	7	0	0	0	0	0	11	17
Cleveland	109	40	40	16	4	3	5	25	36	25
Columbus	8	8	3	0	0	1	0	14	8	10
Toledo	19	10	13	0	1	3	0	13	15	16
Indiana:										
Fort Wayne	6	4	6	0	1	1	0	2	3	5
Indianapolis	67	20	13	0	0	0	5	11	10	8
South Bend	6	1	2	0	0	3	0	2	4	2
Terre Haute	10	3	1	0	1	0	0	0	2	7
Illinois:										
Chicago	121	158	78	12	5	194	13	112	123	153
Cicero	1	3	1	0	0	0	0	0	1	2
Peoria	12	1	0	0	0	0	0	4	6	5
Springfield	5	2	3	0	0	0	6	1	1	2
Michigan:										
Detroit	28	79	36	1	1	2	5	42	78	73
Flint	4	11	0	0	0	0	1	0	8	3
Grand Rapids	7	6	4	0	0	20	2	2	6	8
Wisconsin:										
Madison	16	2	0	0	----	0	67	----	2	2
Milwaukee	25	24	8	1	1	172	10	11	35	11
Racine	4	2	1	0	0	1	3	0	5	0
Superior	0	1	0	0	0	0	0	0	2	0
W. NORTH CENTRAL										
Minnesota:										
Duluth	5	2	0	0	0	1	1	0	5	14
Minneapolis	43	21	13	0	0	0	13	6	29	64
St. Paul	25	18	16	0	0	1	10	7	16	18
Iowa:										
Davenport	0	1	0	0	----	0	1	----	2	2
Sioux City	3	3	2	0	----	0	0	----	3	1
Waterloo	----	0	1	0	----	0	----	----	4	3
Missouri:										
Kansas City	16	14	9	3	4	0	4	17	12	60
St. Joseph	1	4	3	0	0	0	0	4	3	3
St. Louis	20	73	27	1	0	3	2	----	30	107
North Dakota:										
Fargo	4	0	0	0	0	0	1	1	1	0
Grand Forks	0	1	0	0	----	0	0	----	1	0
South Dakota:										
Aberdeen	7	----	1	0	----	1	1	----	----	----
Sioux Falls	1	1	2	0	0	0	0	0	2	0
Nebraska:										
Lincoln	7	2	3	0	----	0	0	----	2	1
Omaha	5	6	11	0	0	0	0	6	5	
Kansas:										
Topeka	19	2	0	0	0	0	74		1	3
Wichita	7	5	1	0	0	0	0	2	3	0
SOUTH ATLANTIC										
Delaware:										
Wilmington	4	2	3	0	0	1	1	3	3	2
Maryland:										
Baltimore	29	35	30	97	4	3	1	51	27	49
Cumberland	----	1	1	0	0	1	----	1	1	0
Frederick	0	1	0	0	0	0	0	0	0	0

City reports for week ended January 3, 1925—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths, reported	Scarlet fever	
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported				Cases, estimated expectancy	Cases reported
SOUTH ATLANTIC—continued										
District of Columbia:										
Washington	12	20	7	2	1	2	---	17	9	33
Virginia:										
Lynchburg	8	1	2	0	0	0	9	1	0	0
Norfolk	13	3	2	0	---	1	35	---	1	2
Richmond	0	8	11	0	0	1	0	6	5	1
Roanoke	5	2	4	0	1	0	0	3	1	0
West Virginia:										
Charleston	12	1	2	2	0	3	1	4	1	3
Huntington	0	2	1	0	---	0	0	---	1	0
Wheeling	6	2	0	0	1	14	1	3	1	3
North Carolina:										
Raleigh	5	1	0	0	2	0	0	1	1	0
Wilmington	2	0	0	0	1	0	7	0	1	0
Winston-Salem	5	1	3	0	0	0	2	4	1	3
South Carolina:										
Charleston	0	2	1	0	0	0	0	5	0	1
Columbia	0	1	0	0	0	0	3	1	0	0
Greenville	0	0	0	0	0	0	0	2	0	0
Georgia:										
Atlanta	2	4	3	4	2	0	2	14	4	2
Brunswick	2	0	0	0	1	0	0	0	0	0
Savannah	0	1	2	0	0	0	1	5	1	0
Florida:										
St. Petersburg	1	0	0	0	0	0	0	2	0	0
Tampa	0	2	1	2	0	0	0	0	0	1
EAST SOUTH CENTRAL										
Kentucky:										
Covington	2	1	1	0	0	0	2	2	1	3
Lexington	5	1	1	0	0	0	0	2	1	1
Louisville	4	10	7	2	0	1	0	15	5	6
Tennessee:										
Memphis	6	8	3	0	2	1	0	8	3	9
Nashville	1	3	1	0	1	1	0	6	2	1
Alabama:										
Birmingham	18	3	3	4	7	0	1	18	4	7
Mobile	2	1	0	0	1	0	1	4	0	2
Montgomery	0	1	1	1	0	0	0	0	0	2
WEST SOUTH CENTRAL										
Arkansas:										
Fort Smith	0	2	1	0	---	0	2	---	1	0
Little Rock	0	2	0	2	0	1	1	7	2	1
Louisiana:										
New Orleans	3	14	15	3	3	1	0	31	3	4
Shreveport	4	---	0	0	0	0	0	5	---	0
Oklahoma:										
Oklahoma	3	2	1	0	0	0	0	3	3	0
Tulsa	5	3	1	0	---	1	---	---	2	3
Texas:										
Dallas	26	9	9	0	1	0	1	5	2	11
Galveston	0	1	1	0	0	0	0	4	0	0
Houston	---	3	4	0	4	0	---	12	1	2
San Antonio	0	1	2	0	2	0	0	13	0	0
MOUNTAIN										
Montana:										
Billings	10	0	0	0	0	0	0	2	1	1
Great Falls	5	1	3	0	0	8	0	0	1	0
Helena	---	0	1	0	0	0	---	0	0	0
Missoula	---	0	2	0	0	0	---	0	0	1
Idaho:										
Boise	0	0	0	0	0	0	0	0	1	1
Colorado:										
Denver	46	10	7	0	4	1	45	19	9	7
Pueblo	22	4	1	0	0	2	1	2	3	2

City reports for week ended January 3, 1925—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths, reported	Scarlet fever	
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported				Cases, estimated expectancy	Cases reported
MOUNTAIN—contd.										
New Mexico:										
Albuquerque	7	1	9	0	0	0	0	2	0	0
Arizona:										
Phoenix	1	----	1	0	0	1	0	3	----	2
Utah:										
Salt Lake City	30	2	0	0	0	1	13	1	4	3
Nevada:										
Reno	0	0	0	0	0	0	0	0	0	2
PACIFIC										
Washington:										
Seattle	30	6	11	0	----	2	14	----	----	8
Spokane	18	3	1	0	----	16	0	----	4	3
Tacoma	6	3	0	0	0	0	2	6	3	6
Oregon:										
Portland	14	7	9	0	0	1	0	12	6	7
California:										
Los Angeles	----	34	----	----	1	----	----	21	15	----
Sacramento	1	21	3	0	0	0	0	2	1	2
San Francisco	14	26	13	6	2	0	6	17	13	11

Division, State, and city	Population July 1, 1923, estimated	Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
		Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
NEW ENGLAND										
Maine:										
Lewiston	33,790	0	0	0	1	0	0	0	----	10
Portland	73,129	0	0	0	0	0	1	0	4	17
New Hampshire:										
Concord	22,408	0	0	0	0	0	0	0	0	13
Nashua	29,234	0	0	0	0	0	0	0	2	5
Vermont:										
Barre	[1] 10,008	0	0	0	2	0	0	0	0	8
Burlington	23,613	0	0	0	0	0	0	0	1	12
Massachusetts:										
Boston	770,400	0	0	0	9	1	5	1	29	247
Fall River	120,912	0	0	0	0	0	0	0	9	35
Springfield	144,227	0	0	0	0	0	0	0	13	30
Worcester	191,927	0	0	0	3	0	2	0	1	57
Rhode Island:										
Pawtucket	68,799	0	0	0	0	0	0	0	0	29
Providence	242,378	0	0	0	3	0	2	1	0	73
Connecticut:										
Bridgeport	[1] 143,555	0	0	0	3	0	0	0	0	39
Hartford	[1] 138,036	0	0	0	1	0	0	0	0	26
New Haven	172,967	0	0	0	3	0	0	0	7	45
MIDDLE ATLANTIC										
New York:										
Buffalo	536,718	0	0	0	0	1	4	0	28	132
New York	5,927,625	0	0	0	[2] 116	12	99	17	100	1,582
Rochester	317,867	0	0	0	1	0	1	0	9	79
Syracuse	184,511	0	0	0	1	0	2	0	3	47
New Jersey:										
Camden	124,157	0	1	0	1	0	0	0	3	44
Newark	438,699	0	0	0	11	0	1	1	59	129
Trenton	127,390	0	0	0	4	0	0	0	8	47

[1] Population Jan. 1, 1920.

[2] Pulmonary only.

City reports for week ended January 3, 1925—Continued

Division, State, and city	Population July 1, 1923, estimated	Smallpox: Cases, estimated expectancy	Smallpox: Cases reported	Smallpox: Deaths reported	Tuberculosis, deaths reported	Typhoid fever: Cases, estimated expectancy	Typhoid fever: Cases reported	Typhoid fever: Deaths reported	Whooping cough, cases reported	Deaths, all causes
MIDDLE ATLANTIC—continued										
Pennsylvania:										
Philadelphia	1,922,788	0	4	0	34	3	5	0	53	597
Pittsburgh	613,442	1	0	0	9	1	3	3	4	224
Reading	110,917	0	0	0	3	0	0	0	4	21
Scranton	140,636	0	0	0	3	0	4	1	5	------
EAST NORTH CENTRAL										
Ohio:										
Cincinnati	406,312	1	0	0	7	0	3	0	0	129
Cleveland	888,519	2	1	0	16	1	3	1	14	214
Columbus	261,082	0	7	0	5	0	1	0	2	90
Toledo	268,338	2	0	0	4	0	1	0	18	78
Indiana:										
Fort Wayne	93,573	0	0	0	2	0	1	0	2	25
Indianapolis	342,718	2	9	0	2	0	0	0	0	84
South Bend	76,709	0	0	0	0	0	0	0	0	13
Terre Haute	68,939	0	8	0	0	0	0	0	0	24
Illinois:										
Chicago	2,886,121	1	0	0	42	3	27	2	105	781
Cicero	55,968	0	0	0	0	0	0	0	0	6
Peoria	79,675	1	0	0	0	0	0	0	0	18
Springfield	61,833	0	0	0	0	0	1	1	0	30
Michigan:										
Detroit	995,668	3	5	0	23	2	1	2	27	267
Flint	117,968	1	0	0	1	0	0	0	0	19
Grand Rapids	145,947	1	1	0	0	0	1	0	7	37
Wisconsin:										
Madison	42,519	0	0	------	------	0	0	------	0	8
Milwaukee	484,595	2	1	0	3	0	0	0	14	105
Racine	[1] 64,393	0	3	0	1	0	0	0	0	8
Superior	39,671	2	1	0	1	0	0	0	0	7
WEST NORTH CENTRAL										
Minnesota:										
Duluth	106,289	1	0	0	2	0	0	0	4	11
Minneapolis	409,125	9	44	21	3	0	2	0	3	111
St. Paul	241,891	12	6	0	2	1	0	0	11	68
Iowa:										
Davenport	61,262	1	3	------	------	0	0	------	0	------
Sioux City	79,662	0	0	------	------	0	0	------	2	------
Waterloo	39,667	0	3	------	------	0	0	------	0	------
Missouri:										
Kansas City	351,819	2	0	0	7	1	0	0	0	103
St. Joseph	78,232	1	0	0	1	0	0	0	0	38
St. Louis	803,353	1	4	0	12	2	0	0	3	245
North Dakota:										
Fargo	24,841	1	0	0	0	0	0	0	0	6
Grand Forks	14,547	1	0	------	------	0	0	------	0	------
South Dakota:										
Aberdeen	15,829	------	0	------	------	------	0	------	2	------
Sioux Falls	29,206	0	0	0	0	0	0	0	0	7
Nebraska:										
Lincoln	58,761	1	0	0	0	0	1	0	1	24
Omaha	204,382	2	5	0	0	0	0	0	0	54
Kansas:										
Topeka	52,555	0	0	0	0	0	0	0	2	22
Wichita	79,261	0	0	0	1	0	0	0	1	27
SOUTH ATLANTIC										
Delaware:										
Wilmington	117,728	0	0	0	3	0	0	1	0	33
Maryland:										
Baltimore	773,580	0	0	0	17	2	5	0	38	254
Cumberland	32,361	0	0	0	0	0	0	0	------	9
Frederick	11,301	0	0	0	0	0	1	0	0	3

[1] Population Jan. 1, 1920.

City reports for week ended January 3, 1925—Continued

Division, State, and city	Population July 1, 1923, estimated	Smallpox: Cases, estimated expectancy	Smallpox: Cases reported	Smallpox: Deaths reported	Tuberculosis, deaths reported	Typhoid fever: Cases, estimated expectancy	Typhoid fever: Cases reported	Typhoid fever: Deaths reported	Whooping cough, cases reported	Deaths, all cause
SOUTH ATLANTIC—continued										
District of Columbia:										
Washington	[1] 437,571	0	0	0	17	1	9	4	17	141
Virginia:										
Lynchburg	30,277	0	0	0	0	0	0	0	1	10
Norfolk	159,089	0	0	0		1	0		7	
Richmond	181,044	0	0	0	1	0	0	0	1	39
Roanoke	55,502	0	0		1	0	0	0	0	15
West Virginia:										
Charleston	45,597	0	7	0	1	0	3	0	0	30
Huntington	57,918	0	3			0	0		0	
Wheeling	[1] 56,208	0	0	0	0		0	1	0	26
North Carolina:						0				
Raleigh	20,171	0	2	0	2	0	0	0	0	10
Wilmington	35,719	0	4	0	0	0	0	0	0	10
Winston-Salem	56,230	1	2		2		0	0	0	14
South Carolina:				0		0				
Charleston	71,245	0	0	0	1	0	0	0	0	29
Columbia	39,688	0	0	0	1	0	0	0	0	24
Greenville	25,789	0	3		0		0	0	0	19
Georgia:				0		0				
Atlanta	222,963	2	1	0	4	0	1	0	2	80
Brunswick	15,937	0	0	0	1	0	0	0	0	3
Savannah	89,448	0	0		2		1	1	0	47
Florida:				0		0				
St. Petersburg	24,403	0	0	0	0	0	0	0	0	9
Tampa	56,050	0	0		1		0	1	0	18
EAST SOUTH CENTRAL										
Kentucky:										
Covington	57,877	0	0	0	1	0	0	0	1	19
Lexington	43,673	0	0	0	2	0	0	0	0	14
Louisville	257,671	0	1	0	4	1	1	0	3	92
Tennessee:										
Memphis	170,067	1	1	0	5	0	3	1	0	82
Nashville	121,128	0	1	0	3	0	0	0	1	47
Alabama:										
Birmingham	195,901	1	60	0	7	0	3	0	0	82
Mobile	63,858	0	0	0	3	0	0	0	0	30
Montgomery	45,383	0	2	0	0	0	0	0	0	15
WEST SOUTH CENTRAL										
Arkansas:										
Fort Smith	30,635	0	0			0	0		0	
Little Rock	70,916	0	0	0	2	0	1	0	0	
Louisiana:										
New Orleans	404,575	2	0	0	19	1	2	2	0	181
Shreveport	54,590		0	0	1		0	2	0	31
Oklahoma:										
Oklahoma	101,150	2	1	0	1	0	0	0	0	22
Tulsa	102,018	1	2			0	0			
Texas:										
Dallas	177,274	0	3	0	5	0	1	0	0	59
Galveston	46,877	0	0	0	0	0	3	0	0	25
Houston	154,970	0	4	0	4	0	0	0		60
San Antonio	184,727	0	0	0	6	0	1	1	0	66
MOUNTAIN										
Montana:										
Billings	16,927	0	0	0	0	0	0	0	16	4
Great Falls	27,787	1	2	0	0	0	0	0	0	6
Helena	[1] 12,037	0	0	0	0	0	0	0		4
Missoula	[1] 12,668	0	0	0	1	0	0	0		9
Idaho:										
Boise	22,806	0	3	0	0	0	0	0	0	2
Colorado:										
Denver	272,031	4	0	0	9	0	0	0	1	83
Pueblo	43,519	0	0	0	0	0	0	0	0	8
New Mexico:										
Albuquerque	16,648	0	0	0	1	0	0	0	0	10

[1] Population Jan. 1, 1920.

City reports for week ended January 3, 1925—Continued

Division, State, and city	Population July 1, 1923, estimated	Smallpox: Cases, estimated expectancy	Smallpox: Cases reported	Smallpox: Deaths reported	Tuberculosis, deaths reported	Typhoid fever: Cases, estimated expectancy	Typhoid fever: Cases reported	Typhoid fever: Deaths reported	Whooping cough, cases reported	Deaths, all causes
MOUNTAIN—continued										
Arizona:										
Phoenix	33,899	------	0	0	8	------	0	0	0	29
Utah:										
Salt Lake City	126,241	2	0	0	3	0	0	0	3	37
Nevada:										
Reno	12,429	0	0	0	0	0	0	0	0	3
PACIFIC										
Washington:										
Seattle	[1] 315,685	1	10	------	------	1	1	------	3	------
Spokane	104,573	7	0	------	------	0	0	------	2	------
Tacoma	101,731	1	1	0	1	0	0	0	0	27
Oregon:										
Portland	273,621	6	13	0	2	0	0	0	6	------
California:										
Los Angeles	666,853	2	------	0	23	1	------	0	------	266
Sacramento	69,950	0	4	0	3	0	0	0	0	17
San Francisco	539,038	0	0	0	15	0	0	0	1	177

Division, State, and city	Cerebrospinal meningitis: Cases	Cerebrospinal meningitis: Deaths	Lethargic encephalitis: Cases	Lethargic encephalitis: Deaths	Pellagra: Cases	Pellagra: Deaths	Poliomyelitis (infantile paralysis): Cases, est. expectancy	Poliomyelitis (infantile paralysis): Cases	Poliomyelitis (infantile paralysis): Deaths
NEW ENGLAND									
Massachusetts:									
Boston	0	0	1	1	0	0	0	0	0
Fall River	1	1	0	0	0	0	0	0	0
Worcester	0	0	2	0	0	0	0	0	0
MIDDLE ATLANTIC									
New York:									
New York	1	3	20	1	0	0	1	0	1
Syracuse	0	0	2	0	0	0	0	0	0
New Jersey:									
Camden	0	0	1	1	0	0	0	0	0
Pennsylvania:									
Philadelphia	2	1	4	0	0	0	0	0	0
EAST NORTH CENTRAL									
Ohio:									
Cleveland	0	0	1	0	0	0	0	0	0
Illinois:									
Chicago	0	0	3	1	0	0	0	0	0
Michigan:									
Detroit	1	0	2	1	0	0	0	2	0
Wisconsin:									
Milwaukee	1	0	2	1	0	0	0	0	0
WEST NORTH CENTRAL									
Iowa:									
Davenport	0	------	1	------	0	------	0	0	------
Missouri:									
St. Louis	0	0	1	0	0	0	0	0	0
Kansas:									
Topeka	1	1	0	0	0	0	0	0	0

City reports for week ended January 3, 1925—Continued

Division, State, and city	Cerebro-spinal meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, est. expectancy	Cases	Deaths
SOUTH ATLANTIC									
Maryland:									
Baltimore	0	1	3	0	0	0	0	0	0
Virginia:									
Richmond	0	0	0	0	0	1	0	0	0
West Virginia:									
Wheeling	1	1	0	0	0	0	0	0	0
Georgia:									
Savannah	0	0	0	0	0	1	0	0	0
EAST SOUTH CENTRAL									
Kentucky:									
Louisville	1	1	0	0	0	0	0	0	0
Tennessee:									
Memphis	0	0	0	0	2	0	0	0	0
Alabama:									
Birmingham	0	0	0	0	1	0	0	0	0
WEST SOUTH CENTRAL									
Louisiana:									
New Orleans	0	0	1	0	0	0	0	0	0
Shreveport	1	0	0	0	0	0	----	0	0
Texas:									
Dallas	0	0	0	0	0	0	0	1	0
Houston	0	0	0	0	0	1	0	0	0
San Antonio	0	1	0	0	0	0	0	0	0
MOUNTAIN									
Nevada:									
Reno	0	0	0	0	0	0	0	1	1
PACIFIC									
Oregon:									
Portland	0	0	2	0	0	0	0	0	0
California:									
San Francisco	1	0	0	0	0	0	0	1	0

The following table gives the rates per hundred thousand population for 105 cities for the 10-week period ended January 3, 1925. The population figures used in computing the rates were estimated as of July 1, 1923, as this is the latest date for which estimates are available. The 105 cities reporting cases had an estimated aggregate population of nearly 29,000,000 and the 97 cities reporting deaths had more than 28,000,000 population. The number of cities included in each group and the aggregate populations are shown in a separate table below.

Summary of weekly reports from cities, October 26, 1924, to January 3, 1925—Annual rates per 100,000 population [1]

DIPHTHERIA CASE RATES

	Week ended—									
	Nov. 1	Nov. 8	Nov. 15	Nov. 22	Nov. 29	Dec. 6	Dec. 13	Dec. 20	Dec. 27	Jan. 3
Total	174	204	201	201	175	[2] 190	[3] 193	[4] 197	150	[4] 155
New England	219	194	204	209	166	258	[3] 208	221	189	238
Middle Atlantic	119	154	158	159	144	170	175	187	149	140
East North Central	156	207	183	168	173	165	167	185	134	151
West North Central	263	265	305	332	307	309	265	299	168	176
South Atlantic	266	301	221	262	260	[5] 173	201	150	134	146
East South Central	154	200	149	183	120	[6] 98	97	149	51	91
West South Central	185	213	274	209	125	144	209	195	116	148
Mountain	267	363	344	258	162	172	315	248	209	191
Pacific	226	209	273	281	128	252	273	[4] 207	226	[4] 129

MEASLES CASE RATES

Total	43	56	58	72	66	[2] 112	[3] 128	[4] 143	105	[4] 158
New England	80	89	102	122	147	164	[3] 282	194	278	380
Middle Atlantic	57	73	68	78	79	105	120	115	235	121
East North Central	52	67	76	97	85	199	207	317	138	294
West North Central	15	15	21	29	10	25	35	19	10	10
South Atlantic	12	26	8	22	14	[5] 22	39	24	35	53
East South Central	0	11	11	11	0	[6] 0	6	11	0	17
West South Central	0	5	5	5	9	0	0	19	14	9
Mountain	29	19	38	38	29	19	48	57	19	115
Pacific	32	41	67	99	52	136	125	[4] 37	70	[4] 83

SCARLET FEVER CASE RATES

Total	184	208	198	223	232	[2] 270	[3] 312	[4] 314	244	[4] 297
New England	239	283	335	385	437	544	[3] 602	552	512	609
Middle Atlantic	151	179	167	185	197	197	260	268	225	286
East North Central	190	200	194	225	228	257	234	311	230	243
West North Central	448	466	456	473	508	616	626	601	468	527
South Atlantic	116	136	118	146	128	[5] 171	252	213	132	203
East South Central	137	166	80	97	57	[6] 162	109	240	126	172
West South Central	70	116	83	65	93	125	162	185	65	83
Mountain	181	181	191	229	143	296	162	239	191	162
Pacific	116	145	116	174	168	197	218	[4] 134	133	[4] 138

SMALLPOX CASE RATES

Total	24	25	35	34	38	[2] 58	[3] 43	[4] 42	41	[4] 40
New England	0	0	0	0	0	0	[3] 0	0	0	0
Middle Atlantic	1	2	0	3	5	5	1	2	2	3
East North Central	12	4	8	10	14	10	13	14	20	27
West North Central	145	170	207	176	236	417	255	239	205	129
South Atlantic	2	6	14	12	6	[5] 48	39	22	28	39
East South Central	51	46	69	120	74	[6] 204	177	314	183	372
West South Central	9	9	37	28	32	19	14	51	19	32
Mountain	0	10	67	19	10	19	19	29	48	48
Pacific	99	93	136	142	136	113	113	[4] 106	122	[4] 69

[1] The figures given in this table are rates per 100,000 population, annual basis, and not the number of cases reported. Populations used are estimated as of July 1, 1923.

[2] Norfolk, Va., and Memphis, Tenn., not included in calculating the rate. Reports not received at time of going to press.

[3] Worcester, Mass., not included.

[4] Los Angeles, Calif., not included.

[5] Norfolk, Va., not included.

[6] Memphis, Tenn., not included.

Summary of weekly reports from cities, October 26, 1924, to January 3, 1925—Annual rates per 100,000 population—Continued

TYPHOID FEVER CASE RATES

	Week ended—									
	Nov. 1	Nov. 8	Nov. 15	Nov. 22	Nov. 29	Dec. 6	Dec. 13	Dec. 20	Dec. 27	Jan. 3
Total	19	22	19	24	29	[3] 45	[3] 43	[4] 56	35	[4] 37
New England	12	17	12	12	22	30	[3] 16	30	17	25
Middle Atlantic	18	12	17	23	46	71	68	101	57	58
East North Central	8	10	8	11	7	22	32	33	24	28
West North Central	19	19	6	17	4	8	17	15	19	4
South Atlantic	26	43	20	28	30	[5] 56	35	30	37	41
East South Central	69	80	114	80	109	[6] 63	57	51	34	40
West South Central	28	83	51	60	37	60	51	56	28	37
Mountain	48	86	76	19	19	10	19	10	0	0
Pacific	29	26	17	46	17	29	17	[4] 14	15	[4] 5

INFLUENZA DEATH RATES

Total	6	7	8	8	10	[2] 12	[3] 17	[4] 16	15	19
New England	2	12	0	5	5	17	[3] 5	15	15	3
Middle Atlantic	11	12	9	9	8	11	22	17	14	21
East North Central	3	3	3	5	11	9	13	9	16	10
West North Central	0	0	0	0	7	4	4	9	7	9
South Atlantic	6	6	8	12	14	[5] 11	22	22	14	26
East South Central	6	6	23	11	29	[6] 28	23	23	51	63
West South Central	15	5	36	15	25	31	36	41	15	51
Mountain	0	0	10	38	19	29	29	48	10	38
Pacific	4	0	20	0	8	8	4	[4] 17	12	12

PNEUMONIA DEATH RATES

Total	110	118	125	120	130	[2] 153	[3] 159	[4] 172	157	203
New England	104	82	87	94	144	127	[3] 109	134	114	174
Middle Atlantic	137	154	149	152	152	188	201	191	178	226
East North Central	70	81	86	90	93	115	125	146	126	165
West North Central	61	63	70	79	74	63	88	68	92	101
South Atlantic	177	152	169	116	169	[5] 191	175	248	205	250
East South Central	120	137	263	206	246	[6] 211	217	297	206	303
West South Central	107	112	173	102	107	163	178	163	229	341
Mountain	57	76	95	143	124	210	200	276	219	229
Pacific	94	127	106	86	94	168	135	[4] 86	147	188

[2] Norfolk, Va., and Memphis, Tenn., not included in calculating the rate. Reports not received at time of going to press.
[3] Worcester, Mass., not included.
[4] Los Angeles, Calif., not included.
[5] Norfolk, Va., not included.
[6] Memphis, Tenn., not included.

Number of cities included in summary of weekly reports and aggregate population of cities in each group, estimated as of July 1, 1923

Group of cities	Number of cities reporting cases	Number of cities reporting deaths	Aggregate population of cities reporting cases	Aggregate population of cities reporting deaths
Total	105	97	28,898,350	28,140,934
New England	12	12	2,098,746	2,098,746
Middle Atlantic	10	10	10,304,114	10,304,114
East North Central	17	17	7,032,535	7,032,535
West North Central	14	11	2,515,330	2,381,454
South Atlantic	22	22	2,566,901	2,566,901
East SouthCentral	7	7	911,885	911,885
West South Central	8	6	1,124,564	1,023,013
Mountain	9	9	546,445	546,445
Pacific	6	3	1,797,830	1,275,841

FOREIGN AND INSULAR

PLAGUE ON VESSEL

Steamship "Conde," at Marseille, France—Plague rat found.—A plague rat was reported found on the steamship *Conde*, of the Havraise Peninsulaire line, at Marseille, France, November 6, 1924. The vessel sailed November 12, 1924, for Tamatave, Madagascar.

CANADA

Communicable diseases—Ontario—Nov. 30–Dec. 27, 1924—Comparative.—Communicable diseases were reported in the Province of Ontario, Canada, during the four-week period ended December 27, 1924, as follows:

Disease	1924		1923	
	Cases	Deaths	Cases	Deaths
Cerebrospinal meningitis	6	4	1	1
Chancroid			9	
Chicken pox	852		1,087	
Diphtheria	364	27	457	24
Gonorrhea	110		168	
German measles	11		18	
Goiter	46	3	5	3
Influenza		13		9
Lethargic encephalitis	10	3	3	2
Measles	1,363	8	762	1
Mumps	588		306	1
Pneumonia		115		188
Poliomyelitis (infantile paralysis)	6	1	2	1
Scarlet fever	618	9	1,060	18
Smallpox	33		51	
Syphilis	95		169	
Tetanus		2		
Tuberculosis	123	64	166	85
Typhoid fever	85	12	40	11
Whooping cough	279	3	179	6

Smallpox prevalence in municipalities.—Occurrence was reported in 13 municipalities, the largest number of cases, viz, 5, being reported at Sherwood Township and at Stratford. One death was reported at Paris; one case each was reported by three municipalities.

CUBA

Communicable diseases—Habana—December, 1924.—During the month of December, 1924, communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Remaining under treatment Dec. 30, 1924	Disease	Cases	Deaths	Remaining under treatment Dec. 30, 1924
Chicken pox	2		1	Measles	9	1	2
Diphtheria	17	5	1	Paratyphoid fever	1		
Leprosy			9	Scarlet fever	3		3
Malaria[1]	100	1	37	Typhoid fever[1]	36	10	27

[1] A number of the cases of typhoid fever and malaria were from the interior of the island.

CZECHOSLOVAKIA

Communicable diseases—July-September, 1924.—During the period July to September, 1924, communicable diseases were notified in Czechoslovakia as follows:

Disease	Cases	Deaths	Province showing greatest number of cases and deaths
Anthrax	33	3	Slovakia, cases, 12; deaths, 2.
Cerebrospinal meningitis	31	10	Bohemia, cases, 9; deaths, 7.
Diphtheria	694	31	Bohemia, cases, 367; deaths, 17.
Dysentery	515	30	Slovakia, cases, 354; deaths, 23.
Malaria	75	----------	Russinia, cases, 61.
Paratyphoid fever A	1	----------	Bohemia,
Paratyphoid fever B	74	4	Bohemia, cases, 68; deaths, 3.
Rabies	7	7	
Scarlet fever	1,691	76	Moravia, cases, 616; deaths, 40.
Smallpox	1	----------	Moravia,
Trachoma	644	----------	Moravia, cases, 259.
Typhoid fever	2,065	105	Bohemia, cases, 637; deaths, 53.
Typhus fever	3	----------	Russinia, cases, 3.

EGYPT

Status of plague.—During the week ended December 9, 1924, four cases of plague were reported in Egypt, occurring as follows: *Alexandria,* one case; *Port Said,* one case; *Suez,* two cases.

Summary.—From January 1 to December 9, 1924, 365 cases of plague were reported; previous year, corresponding period, 1,462 cases.

ESTHONIA

Typhoid fever—Paratyphoid—November, 1924.—During the month of November, 1924, 67 cases of typhoid fever and nine cases of paratyphoid fever were reported in the Republic of Esthonia. Population, 1,107,069.

FINLAND

Typhoid fever—Paratyphoid—November 1-15, 1924.—During the period November 1 to 15, 1924, 32 cases of typhoid fever and 195 cases of paratyphoid fever were reported in the Republic of Finland. Population, 3,402,593.

JAMAICA

Smallpox (reported as alastrim)—Nov. 30-Dec. 27, 1924.—During the four-week period ended December 27, 1924, 33 cases of smallpox (reported as alastrim) were notified in the Island of Jamaica, of which four cases occurred at Kingston.

LATVIA

Communicable diseases—October, 1924.—During the month of October, 1924, 3 cases of smallpox, 126 of typhoid fever, 5 of typhus fever, and 3 of paratyphoid fever were reported in the Republic of Latvia. Population, 2,000,000.

MADAGASCAR

Plague—Tananarive Province—November 1-15, 1924.—During the period November 1 to 15, 1924, 47 cases of plague with 42 deaths were reported in the province of Tananarive, Island of Madagascar. For distribution of occurrence according to locality and type, see page 186.

MALTA

Certain communicable diseases—October, 1924.—During the month of October, 1924, there were reported in the Island of Malta, 7 cases of lethargic encephalitis, 77 cases of Malta (undulant) fever, and 36 cases of typhoid fever with 5 deaths. Population, 216,702.

PANAMA CANAL

Communicable diseases—November, 1924.—During the month of November, 1924, communicable diseases were notified in the Canal Zone and at Colon and Panama, as follows:

Disease	Canal Zone	Colon	Panama	Nonresident	Total
Chicken pox	3	7	12		22
Diphtheria			2		2
Dysentery	1	1	2	4	8
Hookworm		7	50	54	111
Leprosy		1	1	2	4
Malaria	58	1	2	33	94
Measles		1	10		11
Meningitis	1		1	1	3
Mumps	2				2
Pneumonia	2	5	30		37
Scarlet fever				1	1
Tuberculosis	3	3	27		33
Typhoid fever				1	1
Whooping cough	2	3	2		7

SALVADOR

Quarantine on account of yellow fever raised.—The quarantine imposed in August, 1924, in the Canal Zone, Panama, against the Republic of Salvador, on account of yellow fever, was raised January 12, 1925.

CHOLERA, PLAGUE, SMALLPOX, AND TYPHUS FEVER

The reports contained in the following tables must not be considered as complete or final as regards either the lists of countries included or the figures for the particular countries for which reports are given.

Reports Received During Week Ended January 23, 1925 [1]

CHOLERA

Place	Date	Cases	Deaths	Remarks
India				Nov. 9-15, 1924: Cases, 2,003; deaths, 1,290.
Bombay	Nov. 23-29	1	1	
Siam:				
Bangkok	Nov. 16-22	1	2	

[1] From medical officers of the Public Health Service, American consuls, and other sources.

CHOLERA, PLAGUE, SMALLPOX, AND TYPHUS FEVER—Continued

Reports Received During Week Ended January 23, 1925—Continued

PLAGUE

Place	Date	Cases	Deaths	Remarks
Canary Islands:				
Las Palmas				Stated to have been declared infected with human and rodent plague, Sept. 30, 1924.
Ceylon:				
Colombo	Nov. 23-Dec. 6	3	3	
Ecuador:				
Guayaquil	Dec. 1-15	2	1	Rats taken, 8,875; infected, 14.
Egypt				Dec. 3-9, 1924: Cases, 4. Jan. 1-Dec. 9, 1924: Cases, 365. Corresponding period, 1923, cases, 1,462.
Alexandria	Dec. 3-9	1		
Port Said	do	1		
Suez	do	2		
India				Nov. 9-15, 1924: Cases, 2,451; deaths, 1,730.
Bombay	Nov. 22-29	1	1	
Karachi	Nov. 30-Dec. 6	2	1	
Madagascar				Nov. 1-15, 1924: Cases, 47; deaths, 42.
Province—				
Tananarive	Nov. 1-15	47	42	
Tananarive	do	4	3	Bubonic, pneumonic, septicemic.
Other localities	do	43	39	Do.
On vessel:				
S. S. Conde				At Marseille, France, Nov. 6, 1924. Plague rat found. Vessel left for Tamatave, Madagascar, Nov. 12, 1924.

SMALLPOX

British South Africa:				
Northern Rhodesia	Nov. 11-24	15		
Canada:				
British Columbia—				
Vancouver	Dec. 28-Jan. 3	21		
Manitoba—				
Winnipeg	do	10		
Ontario				Nov. 30-Dec. 27, 1924: Cases, 33, occurring in 13 localities; corresponding period, 1923: Cases, 51.
China:				
Amoy	Nov. 23-29			Present.
Foochow	Nov. 16-Dec. 13			Do.
Hongkong	Nov. 9-15	1		
Shanghai	Dec. 7-13	1	1	Case, foreign; death, Chinese.
Czechoslovakia				Apr.-June, 1924: Case, 1, occurring in Province of Moravia.
Ecuador:				
Guayaquil	Dec. 1-15	2		
Egypt:				
Alexandria	Dec. 3-16	4		
Great Britain:				
New Castle on Tyne	Dec. 14-20	1		
India				Nov. 9-15, 1924: Cases, 814; deaths, 170.
Bombay	Nov. 23-29	3	2	
Karachi	Nov. 30-Dec. 13	7		
Indo-China:				
Saigon	Nov 16-22	1	1	Including 100 sq. km. of surrounding country.
Jamaica				Nov. 30-Dec. 27, 1924: Cases, 33 (reported as alastrim).
Kingston	Nov. 30-Dec. 27	4		
Java:				
East Java—				
Soerabaya	Nov. 9-15	77	23	
Latvia				Oct. 1-31, 1924: Cases, 3.
Mexico:				
Durango	Dec. 1-31		5	
Mexico City	Dec. 7-13	1		
Tampico	Dec. 21-31	3	3	
Vera Cruz	Dec. 29-Jan. 3		3	
Portugal:				
Lisbon	Dec. 14-20	10		
Oporto	Dec. 14-27	1	1	
Spain:				
Malaga	Dec. 21-27		11	
Tunis:				
Tunis	Dec. 16-29	9	12	

CHOLERA, PLAGUE, SMALLPOX, AND TYPHUS FEVER—Continued

Reports Received During Week Ended January 23, 1925—Continued

TYPHUS FEVER

Place	Date	Cases	Deaths	Remarks
Algeria:				
Algiers	Dec. 1–10	1		
Chile:				
Concepcion	Nov. 25–Dec. 1		1	
Iquique	Nov. 30–Dec. 6		2	
Talcahuano	Dec. 14–20		1	On Dec. 20, 1924, 8 cases present.
Valparaiso	Dec. 1–7		3	
Czechoslovakia				Apr.–June, 1924: Cases 3, occurring in Province of Russinia.
Egypt:				
Alexandria	Dec. 3–9	1	1	
Cairo	Oct. 29–Nov. 11	3	3	
Latvia				Oct. 1–31, 1924: Cases, 5.
Mexico:				
Durango	Dec. 1–31		1	
Mexico City	Dec. 7–13	8		
Poland				Oct. 5–11, 1924: Cases, 22; deaths, 2. Recurrent fever, 3 cases.
Spain:				
Malaga	Dec. 21–27		1	

Reports Received from December 27, 1924, to January 16, 1925 [1]

CHOLERA

Place	Date	Cases	Deaths	Remarks
Ceylon:				
Colombo	Nov. 16–22	1		
India				Oct. 19–Nov. 8, 1924: Cases, 8,280; deaths, 4,832.
Calcutta	Oct. 26–Nov. 29	35	29	
Madras	Nov. 16–Dec. 6	41	26	
Rangoon	Nov. 9–29	5	2	
Indo-China				Aug. 1–31, 1924: Cases, 7; deaths, 6. August, 1923: Cases, 13; deaths 10 native, and 1 fatal case European
Province—				
Anam	Aug. 1–31	1	1	
Cambodia	do	2	2	
Cochin-China	do	4	3	
Siam:				
Bangkok	Nov. 9–15	2		

PLAGUE

Azores:				
Ponta Delgada	Dec 6–12	9	5	
British East Africa:				
Kenya—				
Uganda	Aug. 1–31	79	62	
Celebes:				
Macassar	Oct. 29			Epidemic.
Ceylon:				
Colombo	Nov. 9–22	4	3	One plague rodent.
China:				
Nanking	Nov. 23–Dec. 6			Present.
Ecuador:				
Guayaquil	Nov. 16–30	6	2	Rats taken, 8,802; found infected, 19.
Eygpt				Jan. 1–Dec. 2, 1924: Cases, 361. Corresponding period, year 1923—cases, 1,448.
City—				
Alexandria	Dec. 4	1	1	Bubonic.
Port Said	Dec. 1	1	1	
Suez	Dec. 3	1	1	
Hawaii				Dec. 9, 1924: Plague-infected rodent found in vicinity of Honokaa village.

[1] From medical officers of the Public Health Service, American consuls, and other sources. For reports received from June 28 to Dec. 26, 1924, see Public Health Reports for Dec. 26, 1924. The tables of epidemic diseases are terminated semiannually and new tables begun.

CHOLERA, PLAGUE, SMALLPOX, AND TYPHUS FEVER—Continued

Reports Received from December 27, 1924, to January 16, 1925—Continued

PLAGUE—Continued

Place	Date	Cases	Deaths	Remarks
India				Oct. 19–Nov. 8, 1924: Cases, 7,640; deaths, 5,733.
Madras (Presidency)	Nov. 23–Dec. 6	182	128	
Rangoon	Oct. 26–Nov. 29	12	11	
Indo-China				Aug. 1–31, 1924: Cases, 13; deaths, 8. Corresponding period, 1923: Cases, 23; deaths, 21.
Province—				
Anam	Aug. 1–31	2	2	
Cambodia	do	9	6	
Cochin-China	do	2		
Java:				
Cheribon district	Oct. 14–Nov. 3		14	
Pekalongan district	do		29	
Soerabaya district—				
Soerabaya	Nov. 4			Epidemic. Seaport.
Tegal	Oct. 14–20		3	
Madagascar				Oct. 16–31, 1924: Cases, 36; deaths, 33.
Tananarive Province—				
Tananarive Town	Oct. 16–31	2	2	Bubonic.
Other localities	do	34	31	Bubonic, 15; pneumonic, 7; septicemic, 9.
Straits Settlements:				
Singapore	Nov. 9–15	1	1	

SMALLPOX

Bolivia:				
La Paz	Nov. 1–30	12	7	
Brazil:				
Pernambuco	Nov. 16–22	21	4	
British South Africa:				
Northern Rhodesia	Oct. 28–Nov. 10	28	2	In natives.
Canada:				
British Columbia—				
Vancouver	Dec. 14–20	11		
Manitoba—				
Winnipeg	Dec. 7–13	4		
China:				
Amoy	Nov. 9–22			Present.
Antung	Nov. 17–23	1		
Foochow	Nov. 2–8			Do.
Ecuador:				
Guayaquil	Nov. 16–30	2		
Egypt:				
Alexandria	Nov. 12–18	1		
Gibraltar	Dec. 8–14	1		
Great Britain:				
England and Wales	Nov. 23–Dec. 6	184		
India				Oct. 19–Nov. 8, 1924: Cases, 2,243; deaths, 503.
Bombay	Nov. 2–22	5	4	
Calcutta	Oct. 26–Nov. 29	72	46	
Karachi	Nov. 16–22	2	1	
Madras	Nov. 16–Dec. 6	32	16	
Rangoon	Oct. 26–Nov. 29	32	9	
Indo-China				Aug. 1–31, 1924; Cases, 145; deaths, 54.
Province—				August, 1923: Cases, 177 (European, 20); deaths, 31 (European, 1).
Anam	Aug. 1–31	41	9	
Cambodia	do	24	8	
Cochin-China	do	72	30	
Tonkin	do	8	7	
Iraq:				
Bagdad	Nov. 9–15	1	1	
Java:				
East Java—				
Soerabaya	Oct. 19–Nov. 8	284	85	
Province—				
Batam	Oct. 14–20	2		
Batavia	Oct. 21–Nov. 14	2		
Cheribon	Oct. 14–Nov. 3	14		
Pasoeroean	Oct. 26–Nov. 1	9	1	
Pekalongan	Oct. 14–Nov. 3	20		
Mexico:				
Guadalajara	Dec. 2 –29		1	
Mexico City	Nov. 23–29	1		
Tampico	Dec. 11–20	2	1	
Vera Cruz	Dec. 1–28		7	

CHOLERA, PLAGUE, SMALLPOX, AND TYPHUS FEVER—Continued

Reports Received from December 27, 1924, to January 16, 1925—Continued

SMALLPOX—Continued

Place	Date	Cases	Deaths	Remarks
Portugal:				
Lisbon	Dec. 7–13	9		
Oporto	Nov. 30–Dec. 6	2	1	
Russia				Jan. 1–June 30, 1924: Cases, 9,683.
Spain:				
Barcelona	Nov. 27–Dec. 10		4	
Cadiz	Nov. 1–30		34	
Madrid	Dec. 14–20		17	
Malaga	Oct. 31–Nov. 13		40	
Valencia	Nov. 30–Dec. 6	2		
Syria:				
Aleppo	Nov. 23–29	1		
Tunis:				
Tunis	Nov. 25–Dec. 15	33	23	
Union of South Africa:				
Cape Province	Nov. 9–15			Outbreaks.
Orange Free State	Nov. 2–8			Do.
Transvaal	Nov. 9–15			Do.

TYPHUS FEVER

Algeria:				
Algiers	Nov. 1–30	1		
Bolivia:				
La Paz	do	2		
Chile:				
Talcahuano	Nov. 16–29		4	10 cases (estimated) present Nov. 22.
Valparaiso	Nov. 25		1	
Egypt:				
Cairo	Oct. 1–28	6	4	
Mexico:				
Guadalajara	Dec. 23–29		1	
Mexico City	Nov. 9–Dec. 6	43		
Palestine				Nov. 12–Dec. 8, 1924: Cases, 7.
Poland				Sept. 28–Oct. 4, 1924; Cases, 28; deaths, 1.
Rumania:				
Constanza	Dec. 1–10	1		
Russia				Jan. 1–June 30, 1924: Cases, 92,000.
Turkey:				
Constantinople	Nov. 15–Dec. 5	3	1	
Union of South Africa:				
Cape Province	Nov. 9–15			Outbreaks.
East London	Nov. 16–22	1		
Orange Free State	Nov. 9–15			Do.
Transvaal	do			Do.
Yugoslavia:				
Belgrade	Nov. 24–Dec. 7	4		